UNIV.OF
TORONTO
LIBRARY

Digitized by the Internet Archive
in 2012 with funding from
University of Toronto

http://archive.org/details/skuleyearbook1929toro

TRANSACTIONS and YEAR BOOK

of

The University of Toronto Engineering Society

April, 1929

TRANSACTIONS and YEAR BOOK

of

The University of Toronto Engineering Society

[Vol. 42]

April, 1929

THE LITTLE RED SCHOOL HOUSE

CONTENTS

Editorial 13

Dean's Message 15

Address of Retiring President 17

New Engineering Projects in England and France.... 19
Dean Mitchell

The Light Weight High Speed Diesel Engine 30
J. F. Durnan

Technical Service Council 42
Lt.-Col. R. E. Smythe

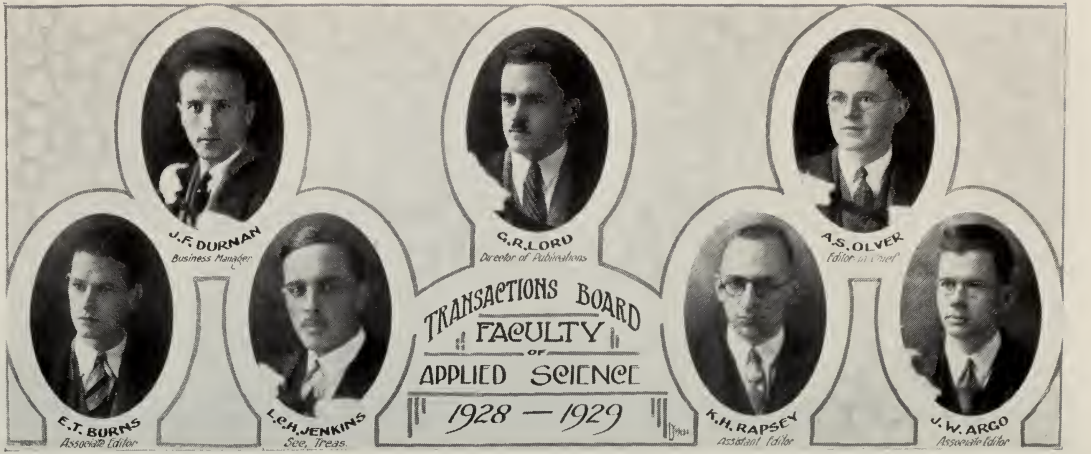
A Year in Europe 46
Professor R. W. Angus

The Engineer-Mind 49
The Honourable R. W. Riddell

An Editorial 52
Professor H. E. T. Haultain

"IF" Again 54

Review of the Year's Activities 57


J.F. DURNAN
Business Manager
E.T. BURNS
Associate Editor
I.C.H. JENKINS
Sec. Treas.
C.R. LORD
Director of Publications
TRANSACTIONS BOARD
FACULTY
OF
APPLIED SCIENCE
1928 — 1929
A.S. OLVER
Editor in Chief
K.H. RAPSEY
Assistant Editor
J.W. ARGO
Associate Editor

Transactions and Year Book

of the

University of Toronto Engineering Society

With which is incorporated "Applied Science"

PUBLISHED ANNUALLY BY THE SOCIETY

No. 42 TORONTO, APRIL 1929 Price 50c

G. R. LORD - - - - *Director of Publications*

ALBERT S. OLVER - - - - - - *Editor-in-Chief*

KEITH H. RAPSEY - - - - - - *Assistant Editor*

J. F. DURNAN
Business Manager

L. C. H. JENKINS
Secretary-Treasurer

E. T. BURNS
Associate Editor

J. W. ARGO
Associate Editor

Editorial

On reading many editorials one comes to the conclusion that the opinions expressed obtained their place through influence rather than merit. We feel the unworthiness of our own opinions—at least the printable ones—so these few paragraphs will be more concerned with the contents of this volume.

There has been a change of feeling in School, it appears, and no longer is there a desire among the members of the Engineering Society to attend meetings and listen to "papers" delivered in the manner that we are told appealed to the undergraduates of by-gone times. The desire now is more for a popular lecture, which, though very interesting, is often seen to contain so much indisguised advertising that it could not be included in TRANSACTIONS without being charged advertising rates or cut up beyond recognition. This is a difficulty that has become more and more noticeable in recent years and it is a problem demanding careful thought from those who follow us. We hope they may be able to find a happy solution—if only for the purpose of aiding harassed editors.

We must, however, have sympathy with the student whose mind at this time of year is surfeited with technical literature and knowledge, and remember that the object of a journal is to get itself read by as many as possible. With these points in mind the articles in TRANSACTIONS have been chosen, and the editorial staff

hope that they have produced a book of interest to both graduate and undergraduate. If criticisms are forthcoming they will be gladly accepted for the sake of higher standards for the future.

Travel is ever interesting, and the paper of Brig.-Gen. C. H. Mitchell on his observations on Engineering in Europe was chosen as one of the year's most accepted addresses. Professor R. W. Angus to whom a year's leave of absence meant only an opportunity to increase his experience for the benefit of his boys found time to write us a short article of his overseas observations.

Another address which was delivered before the Engineering Society is included, that of Col. R. E. Smythe, on the subject of the Technical Service Council. This should be especially noted by the incoming freshmen.

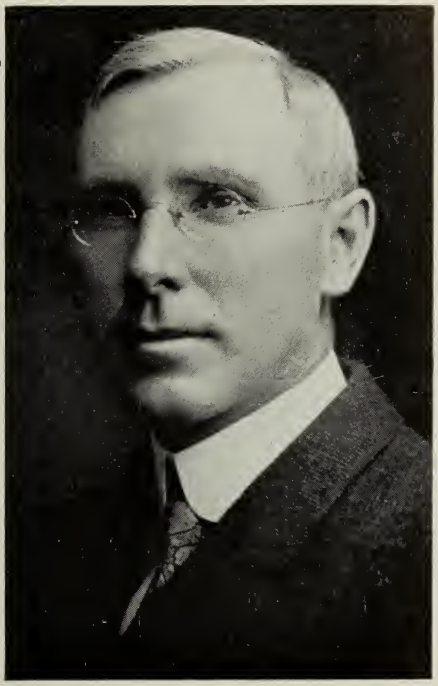
The thesis of J. F. Durnan on "The Light Weight High Speed Diesel Engine" has been thought most suitable as it is on a subject which at the present time is receiving much attention.

Of a slightly different type is an article written especially for TRANSACTIONS by Chief Justice W. R. Riddell who was the chief speaker at the Engineering Society Annual Dinner.

Of the latter half of the annual, well, School as always, speaks for itself.

Finally, the staff wish to most heartily thank the members of the Faculty and the students who have helped to such a degree in the compilation of this, the ninth annual edition of TRANSACTIONS.

The Dean's Message for 1929



To the Members of the Engineering Society:

Gentlemen:—

All of you are fortunate. You who this present year are members of the Engineering Society, whether in the First Year or in the Fourth, are fortunate in being at the University at this time. It is a great time to live.

You of the Fourth Year, the hundred of you, about to go out into life, are going out at a fortunate time with all of Canada agog with activity and bright with prosperity. It has been coming for several years—had you looked back in recent Transactions you could have seen the signs even on the front page. You who are leaving know better than anyone else, how much engineering graduates are in demand. It was quite the other way five years ago.

And you of the First Year, and of the Years between, need not fear you will be late. The tide of Prosperity will still be running and if you keep in the stream you will come in with it. The thing is to keep in the middle of the stream and keep intent upon the main current; do not get drawn off into side streams or eddies.

I have been wondering what kind of message to give you of the Fourth Year this particular time. What things function best with national activity of the kind we now have and what advice is best for young engineers? There is no need to repeat injunctions to keep on studying and learning or to keep reading and observing. You will always do that.

Initiative and resourcefulness are the things to go for now in Canada! Be enterprising! It is the time for enterprise and energy. We are just at that stage when our young engineers can get in on the ground floor. Even after you of the Fourth Year are "in" there will still be lots of room left for the Third, Second and First Years.

You cannot learn initiative or resource from text-books nor even from lectures. You can learn only by practice, by trying, by success and failure, by thinking and doing. You have gone through much of this in the laboratory, in sports, in the Engineering Society. Now, put it into real practice in the world's laboratory, the world's arena and your new business and professional life.

Best success and good fortune to you all,

Yours faithfully,

C. H. Mitchell,
Dean.

Address of Retiring President

Gentlemen of S.P.S.:

I feel an urge to reminisce. It seems to be the duty of the president in the fall to thank everyone for electing him, then to spend the year straightening out impromptu theatre parties, snow-ball fights and modernistic art, and finally to tell the same electors how much he appreciated the honour of being allowed to apologize to speakers for the poor attendance at Engineering Society meetings. Not content with these hardships, his tormentors on the executive make him write a closing message to the dear students. Now I ask you, gentlemen, don't you think that all those who have not supported the Soc. as they might should be tapped and made to read this to complete the punishment?

As regards the At-Home there can be no complaints. It was one of the best parties of the year and was well attended. The dinner on the other hand, plainly showed lack of undergraduate support. No one could ask for a better speaker and the dinner itself was excellent. It is not boasting on my part to praise these functions because, although a member of the committee, I was just one of those "ex officio" appendages which do nothing and hamper the movements of all efficient bodies. Right here I wish to add a word of appreciation for the work Gerry Gray has done this year. As First Vice-President he was in charge of both the Dinner and the At-Home, and certainly did a good job. Gerry handled the elections as well and has been one of the most active members of the executive all year. School Nite needs no comment except that it was in charge of Harry Pritchard and was surely a credit to him.

Elsewhere in this book will be found the financial statement of the Society. I think that it is as good as could be expected since the good old days of apples and chocolate bars are over. That it is so is largely due to the efficiency of our Treasurer, Nate Adams. If space permitted I could go on and tell of the good work done by all the men on your executive. Such men as Art Davison, Ross Lord, Gerry McVean and many others have all helped in no small measure to carry on the year's work.

As I look back over the past six months I cannot help but feel some disappointment concerning the meetings. It seems too bad that so many of the fellows fail to appreciate the importance of attending these things. Apart altogether from the lack of consider-

ation shown for these gentlemen who so willingly sacrifice their time and money for us and who have something really interesting and instructive to tell us, it is most discouraging to think of so many men of the good old School with such a narrow outlook upon their university careers. When will some of us realize that the mere passing of examinations, while very necessary, is merely a part of a liberal education. Why, fellows, if everyone took this uninterested attitude towards all the activities, then the old School would be a hell of a good place to be away from.

Well, I guess that ends the sermon. To all those who have taken an interest in the Society I want to express my sincere thanks for the support you have given! To those who have, largely through thoughtlessness, I trust, not done as much as you feel you should, now is the time to decide to stage a "come-back" next fall. In your new president, Gerry McVean, you have a man of undoubted ability, and with a record of two years' executive experience as president of his year and as second vice-president of the Society. I wish him and his executive every success and trust that he will receive your whole-hearted support and co-operation.

Yours most sincerely,

J. D. Wright.

THE TRANSACTIONS
OF THE
University of Toronto
Engineering Society
WITH WHICH IS INCORPORATED THE "APPLIED SCIENCE"
No. 42 TORONTO, APRIL, 1929 Price 50c.

New Engineering Projects in England and France

*Address by Brig.-Gen. C. H. Mitchell, Dean, Faculty of Applied Science and Engineering, University of Toronto.

Each country or region in which engineering of any kind is carried on, demands design, construction and operation of engineering works in conformity with the characteristics of the country. The governing characteristics are both physical and human; they depend upon climate, on geography, on natural resources and, above all, upon the customs and habits of the people in their requirements of life and business.

We, here, in Canada, have conditions and requirements which are peculiar to the country in all these respects and differ from those of other countries or regions situated not only in other parts of the world, but upon the continent of which we form so large a part.

In the early days of Canada, our engineers looked for inspiration and lead to the engineers of the Mother Country, as is evidenced by our great public works, naimly transportation, of fifty and sixty years ago. This was very prominently brought to my attention last June, during my attendance at the Centenary of the Institution of Civil Engineers in London when, in recitals of the activities of its early members, many of their contributions to the Empire overseas were easily recognizable as applying to Canada.

Nowadays, we find ourselves still thinking in similar terms, notwithstanding our proximity to the influences of the United States and we realize that, as in the past, we have many things still to learn from Britain which continues to lead the world.

Railway and Motor Transportation

As previously, there are many things we can profit by in studying the transportation systems and problems of England. As is

*Delivered before Engineering Society, October 22, 1928.

well known, their railway organizations have been going through difficult times since the war, and while now in better physical condition, have attained this at a financial loss, which is giving considerable concern. It is admitted that the financial crisis through which the railways are passing is serious. During the present year the decrease in traffic receipts for the first six months on the railways in Great Britain has been nearly forty million dollars. Three main reasons have been given by the Chairman of the Railways Managers' Conference:—Reduction of business in heavy industries; wage burdens and taxes imposed by the Government and motor transport competition. In some respects there is a similarity to our railway problems in Canada, as our own systems have complained that they have been required to maintain wage standards, reduce rates and provide for increasing maintenance costs and betterments, all at the same time. Then, too, motor road competition has been having its influence on both our passenger and freight business.

The extent to which motor transport has recently been developed on the highways of Great Britain can be appreciated from the map of the motor coach routes in force this present summer. Thousands of people now travel daily between the great centres on trips requiring from two to six hours, in exactly the same manner as they did a hundred years ago, and over the same roads and through the high streets of the same towns and villages. The combination of these with their magnificent arterial roads and most modern motor rolling stock is one of the remarkable developments of civil and mechanical engineering apparent today in Great Britain.

Among the recent developments on the part of the railways has been that of electrification of steam railways, particularly in the vicinity of London, where there are such enormous numbers of suburban passengers carried. Two of the great railway systems, South West and North East of London, have installed electrification and are continually increasing it. It has been of great interest to observe the manner of doing this, especially in their large stations, yards and junction points. Many technical questions appear to have arisen which, though perhaps peculiar to that country, may provide similar problems in Canada. Among those which I have observed are (1) overhead vs. conductor or third rail layouts and (2) the increase of maintenance of way costs with electric rolling stock. At an engineering conference at which I was present in June, the overhead system seemed to be favoured for voltages higher than 650. Maintenance of way cost was increased due to the greatly increased number of trains electrically driven and the use of smaller wheels.

This is a convenient place to refer to the very extensive railway electrification now going on and accomplished on the railways of Southern France, where practically all the main lines South of Bordeaux and West of Toulouse are now electrified. They give a fine, reliable and rapid service, specially remarkable on their long and heavy express trains. This is made possible by their proximity to the Pyrenees mountains, where there have been some large and

very efficient hydro-electric power stations established in recent years. One noticeable feature of these railways is the employment of reinforced concrete structural "poles" to carry the overhead system. These poles are really towers of heavy construction, in some instances 50 and 60 feet high, as is the case on the newly opened Trans-Pyrenean Railway.

In referring to the rapidly increasing motor business on English roads it must be borne in mind that motor cars are not at all yet so universal as on this side of the water. England, nevertheless, is not without its leadership in this field of engineering. Six weeks ago announcement was made of a new type of motor car which bids fair to revolutionize the industry. It has no clutch or gear shift, but has an automatic variable gear which selects the proper ratio for the engine according to its speed as controlled by the driver by means of the throttle, just as in a steam engine. A car fitted with this device has already run a 25,000 mile road test throughout Great Britain.

Coal and Oil Fuel

Here, perhaps, it is suitable to introduce a note with reference to coal and oil fuel, which is so important to the Empire. As is well known, the mining and use of coal is one of the vital questions to which the British Government has been paying marked attention. It has for some years had in operation an elaborate Fuel Research Station at Greenwich, where studies are made on various coals and their application in samples of ten tons, thus putting the research practically on a commercial basis. In a day's visit to this Station in June last, I was particularly interested in one feature which may prove of great use to us in Canada; that is the liquefaction of coal. Such a process, if made commercially successful on a large scale, would be of inestimable value in the utilization of our great deposits of low grade coals in the North and West. In the researches I saw proceeding there was being produced from a ton of Yorkshire coal of 13,500 B.T.U., in addition to the carbon or coke material a total of about 120 gals. of oils by distillation process. Of this, about 30 gals. was light oil or crude naphtha; 30 gals. was fuel oil such as is used in the Diesel engine and the remaining 60 gals. was heavy oil and pitch, etc. The process involved distillation under a pressure of 3,000 lbs. per sq. in. with a heat of about 500 deg. C.

Water Transportation

It is still to Great Britain that we must go for the leadership in shipping, be it ships, harbours, or docks. Notwithstanding the depression in ship-building and shipping following the war, Britain has again attained a volume comparable with pre-war figures. One cannot approach the shores of England this year without a full realization of the significance of Kipling's stirring lines "The Coastwise Lights of England Watch the Ships of England go".

The four great ocean shipping centres are London, Liverpool, Glasgow, and Southampton, the latter mainly passenger. Last year Liverpool completed a very large addition to its dock accommodation in the new Gladstone Docks. These have added three miles of docks, 58 acres of water and 19 acres of shed covered land. There is also added a new dry dock, 1,050 feet long, 155 feet wide with a maximum of 40 feet depth, constituting it the largest in Europe. As I looked at these great docks with their huge concrete buildings and forests of cranes, I realized how singularly they stood for the greatness of Britain's sea trade. Several of these buildings are 1,500 feet long, 150 feet wide, and provide three floors, said to be the largest concrete buildings in the world.

New Dock at Tilbury Docks, London, under construction on soft Foundation

Similarly, London is greatly increasing its harbour accommodation through the new works being carried on at Tilbury on the lower Thames by the Port of London Authority. Among the new works is an entrance lock from the river into the existing docks. This, now under construction, exhibited when I saw it in June, exceedingly interesting problems in heavy concrete work on soft bottom. The lock is 1,000 feet long between gates, 110 feet wide, with a depth of 45 feet. It is in a confined position and conditions required the use of large concrete monoliths sunk to position to be subsequently incorporated into the lock walls. These reduced the earth pressure behind until the invert floor could be completed. The monoliths were about 25 feet square and 50 feet long. The invert was being put in in alternate sections surrounded by steel sheet piling, on account of the soft bottom and to minimise pumping. It was interesting, from a construction engineer's point of

view, to see the progress of all operations of monolith sinking, "dumpling" excavation between them, invert trenching and invert concreting all proceeding simultaneously according to programme.

A new dry dock is also under way at the Tilbury Docks, having similar construction problems, but its location in a still more confined space between existing basins creates a more acute construction situation. A similar situation was examined at the enlargements of the West India Docks also under way. Here not only was there very soft bottom and sides, some with running sand, but the old lock and dock walls had to be removed, the excavation enlarged, new concrete work put in and the adjoining docks kept in operation. The pumping, shoring, coffer-damming and excavation problems were about as difficult as could be met with, and it was with great interest that I was able to obtain photographs.

While considering British docks, reference should be made to the new harbour works just completed at Havre and the new dry dock now being constructed at Toulon in France. The latter will, when completed, be the largest dry dock in the world, being 1,460 feet long, 165 feet wide, and 40 feet deep. Its construction, extending out into the harbour, is unique, as it is being built within an enormous steel caisson which, with a portion of its concrete, gradually sinks into position on the prepared bed of the harbour.

Aerial Navigation

The subject of aerial navigation is now so much to the front and changes are so rapidly occurring that what is new one year seems almost out of date the next. While some on this side of the water may have the idea that it is here that everything worth while in air matters is taking place, no one who has any first-hand knowledge of the progress in Europe will think of agreeing. One has only to observe the very great activity in present day commercial aviation in Germany, Great Britain, and France to realize that this is so. An Air Time Table of 16 pages issued by well known agents, gives the times of arrival and departure of aeroplanes from London, Paris, Berlin, and other large centres, some services several times daily. This time table, covering all Central Europe, now has the character of a railway time table, with cost of air trips, regulations regarding baggage, etc.

It was most interesting to see the Annual Aeroplane Exhibition held in Paris in July, where there were the latest types of aeroplanes, descriptions of their performances and all manner of exhibits in connection with aerial navigation. It was the counterpart of the Annual Automobile Show. Types in common commercial use by the great international airways companies were much in evidence and visitors to the Exhibition were permitted to enter and examine them. Notable among these were the actual machines which had flown to South America and across the Sahara, and types of the Imperial Airways machines in use in the East. The new Goliath Farman de luxe machine was shown, provided with 500 h.p. capable of a speed of 120 miles per hour and seated for 25 passengers.

The new Croydon Aerodrome, the Airport of London

When in London in June I had the privilege of visiting the Croydon Aerodrome with Sir Sefton Brancker, the Director of the British Service. This airport, fifteen miles south of Charing Cross, is provided with the latest equipment for commercial air service and now ranks as the most up-to-date in operation, although La Bourget, the air port of Paris, which I also saw, is a very close second. Perhaps the most interesting features at Croydon are concerned with the control, reporting and dispatching services whereby the aeroplanes coming and going constantly throughout the day are kept in touch by wireless. The Control Room, with its visual synchronous records, is a somewhat romantic evidence of the very great strides aerial navigation has made the past few years. This is also indicated by the cluster of buildings which, beside the Administration Building, having the control rooms, offices, customs and immigration offices and halls, waiting rooms and ticket offices, express and freight rooms, comprise hangars, work shops and sheds, police and hospital quarters, and a residential

Passengers landing at Croydon Aerodrome from Imperial Airways Company Aeroplane

hotel and restaurant for travellers and staff. It is also of interest to note that the total area, including building areas, of this most important air port, as recently enlarged in the new layout, is about 360 acres.

Even more interesting was a visit to the Government works at Cardington, near Bedford, where the huge new Airship R101 is being constructed. This has proved of increased interest in view of the successful journey across the Atlantic just this week of the German Graf Zepplin and Airship of the same general type. It will be remembered with pride that the British obtained the record in 1919 of the first trip across the Atlantic and return by their original Airship R34. The new British Airship R101 will, when completed,

probably this year, be by far the largest yet attempted, being about 720 feet long and 130 feet in diameter, having a capacity of 5 million cubic feet, which is about one and a half times that of the new Zeppelin which has just crossed.

The construction of R101 embodies many new features and is distinctive as being built by the Government, practically wholly on the site of the Royal Airship Works. The gas bags, while in compartments as is usual, are suspended within the frame by new devices; the frame work of aluminum girders is so built as readily to permit replacement of parts; there are five Diesel type engines each of 650 h.p., using heavy oil as fuel; the propellers have revers ible blades. Provision is being made to carry 50 passengers in addition to crew and the saloons, state rooms and galleries or decks are similar to those on a transatlantic liner, the dining saloon providing seating accommodation for fifty. The principle of the Airship programme contemplates its use on Empire Routes to Egypt, India and Canada, where mooring masts are now being erected. The mast at Cardington, which I had the opportunity of ascending, was a marvel of the latest equipment in this new branch of transportation.

Hydro Electric Power

Hydro Electric Power in Great Britain has made much progress in the past few years and new projects in Wales and Scotland have been under development. Such power, however, is limited by physical conditions and although there are some systems serving large areas, they are being connected up regularly with steam generating systems. The feature of present day tendency is to consolidate the steam systems into regions under the direction of government control, so that the largest number of industries and people can benefit through this means by power provided at minimum rates.

It is in France, however, that the remarkable progress has recently been made in this branch of engineering. It must always be remembered that France gave a great lead in this twenty-five years ago, when the First Power Conference was called at Grenoble in 1902 to discuss "white coal". Since that time very large developments have occurred in the mountain regions of the French Alps, the Maritime Alps and the Pyrenees. Many low head plants have also been built on rivers widely scattered throughout the country. It is interesting to observe the extent and the rate at which France has been "electrified" since the war. In the accompanying slide the intensity of this is shown as in 1926, which indicates the great development of steam generation in the coal regions of Northern France, as well as the hydro regions already referred to. It is also of interest to us in Canada that a Canadian financial concern has recently acquired considerable interest in some of these hydro plants.

In the Pyrenees many new plants are now providing power for operating the newly electrified railways in that region; most of these are of high heads, between 400 and 700 feet, and one has recently been installed in the Central Pyrenees with 3,100 ft. head. High transmission voltages have also been employed with the latest switching devices. Several switching stations were observed, one with 135,000 volts, which have a general appearance similar to our own new Leaside station, opened this month for the Gatineau River power which is being received here at 220,000 volts on an unprecedented scale.

Site of New Head Dam on Romanche River near Grenoble, France

The developments near Grenoble in the French Alps are even more marked. I visited this locality in 1906 and then examined a number of the then recent plants on three power producing rivers. It was with particular interest that I saw these again this year and observed the improvements and additions to existing plants and the installation of many new ones.

On one river in particular, the Romanche, was this increase of development very marked. In 1906 there were then some 8 plants developing about 25,000 h.p. One could realize, then, that this river, by its nature, was destined to some day become wholly developed throughout its entire length. This has now become practically an accomplished fact, with about 15 plants, and in this respect is a splendid object lesson for us in Canada, illustrating how a moderate sized river having a great total fall can be developed by successive plants installed one below the other throughout its course. At the present time these plants follow each other continuously for about 20 miles, the tail water of one becoming the head water of the next below it. This river is now more or less

regulated with normal flows about 1,000 to 1,500 sec. ft., but presents many hydraulic difficulties. It has ice troubles, like our own, as the winter conditions are sometimes severe; it is a "flashy" river, subject to rapid changes and floods in a narrow valley, and it carries a great quantity of glacier silt, which necessitates special head works peculiar to such rivers. The crowded development of the river accentuates the difficulties in all these respects, and as one passes these plants in succession he is struck by the display of sluice gates of the Stony and Taintor types, overflows, weirs, side channels and other complicated headworks appurtenances.

Old Stone Bridge over the Tarn at Albi, France

At the present time the last power plant on the upper end of this river is under construction, it being in the plans to create a large reservoir to form the head water reserve which will serve not only this new plant, but all the plants below. A dam is being built at the head of a narrow canyon, with an intake to a tunnel about three and a half miles long and about 10 ft. square in section, leading to a power station under construction where the narrow valley debouches into a wide one, to operate under about 600 ft. head. This will produce about 70,000 h.p. and bring the total developed power of the river to the neighbourhood of 150,000 h.p.

Bridges

The latest bridge in England, and the one to which much attention has been directed, is the steel High Level Bridge at Newcastle over the Tyne. This has just recently been opened. Its novel feature is the character of its very high arch which, while providing a clear span of only 540 feet, carries the roadway over the top of the

most crowded portion of the city, at the same time permitting passage on the river of vessels requiring about 100 ft. clearance.

In France the outstanding features of bridge construction lie in reinforced concrete. It will be remembered that France lead the world at the end of the century in introducing ferro-concrete construction—the early Hennebique patents, for instance. It is reasonable to say that in 1928 they still lead the world for courage of design, ingenuity and care in their workmanship in this difficult form of construction, as well as in aesthetic characteristics.

Two noble examples to illustrate this may be referred to. There is a reinforced concrete bridge now being constructed near Brest to carry the railway, having an arch span of 600 ft! In Paris there is now almost completed a reinforced concrete highway bridge carrying a much travelled thoroughfare over a series of railway tracks and yards. This bridge consists of two spans of trusses, each 250 ft. continuous over the centre support. The trusses are 33 ft. high and provide for a width of roadway of 66 ft.

In conclusion, with the references to the latest-day bridges in these two countries which have been building bridges for centuries, it may prove of added interest to mention, by contrast, some of the old bridges and other structures which were the product of the bridge engineers and architects of the past. We must all bow to the old Romans, the greatest of engineers in ancient or medieval times, and as an example of their ability, there is none finer than the Pont du Gard in Southern France, an aqueduct which still stands as a model of workmanship. I also had the opportunity of seeing and examining a number of rare medieval brick and stone arch bridges built in that prolific bridge period in the South of France between 1200 and 1400. Among these are the fortified bridge at Orthez, which came untouched through the fierce battle of February, 1814, in the Peninsular war; the brick bridge of 1310 at Albi; the brick bridge of 1303 over the Tarn at Montauban; the old stone bridge at Carcassonne and the historic bridge of St. Benezet over the Rhone at Avignon, built in 1180 and partially destroyed by war and flood in 1650.

The Light Weight High Speed Diesel Engine

A Thesis for the Degree of B.A.Sc.

By J. F. Durnan 1928-29

Owing to the limitations placed on a thesis of this kind, it is intended to deal with information pertaining to the light weight high speed Diesel engine suitable for motor traction work and especially adapted for large trucks and buses. It is in this class of engine that the greatest advances have been made, and it is to this field of transportation that it offers the best advantages and economy over the present type of carbureter engine now in use.

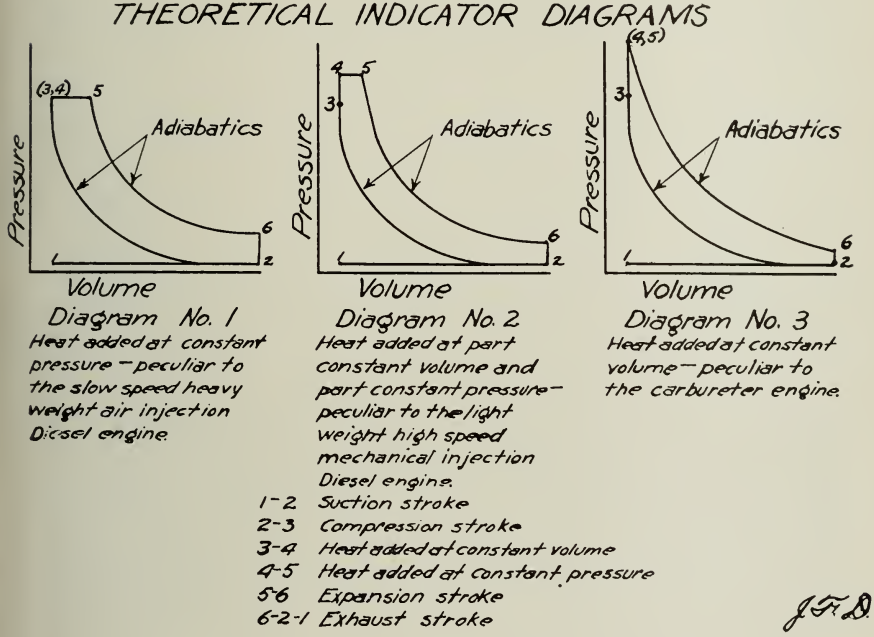
The adoption of the Diesel principle for light weight high speed engines occurred only a few years ago. The difficulties in the way were numerous and some appeared to have no practical solution. This is evident from Mr. Ricardo's statement which was published about ten years ago, "Up to the present time, Diesel engines have not been used for motor traction, nor does there seem to be any prospect of their being so employed, for the sudden changes both , of speed and load, that are demanded of a traction motor could not be dealt with by a Diesel engine, unless some entirely new method could be devised for regulating the rate of admission of the fuel."[1] Up to this time, the Diesel engine had gained a firm standing in the heavy weight slow speed field and it was looked upon as a serious competitor to the steam engine. It was adopted extensively for the propulsion of marine vessels and it was also used to a great extent in high powered stationary engine work. The success of this type of engine was due to its high thermal efficiency, ease of maintenance, and its ability to use cheap heavy oils as fuel.

With the invention of mechanical injection of the fuel, which eliminated the compressor, the first step was made in the solution of the problem of adopting the Diesel principle to the light weight high speed engine. At first the compressorless engine seemed only conditionally utilizable, even for stationary work. However, the rising price of gasoline and the rapid development of the compressorless engine stimulated the endeavours of the Diesel engine builders, and they took up anew the task of producing a high speed vehicle engine.

It was in Germany that the most systematic and scientific development of the light weight high speed Diesel engine was carried out. This has been a steady, purposeful, many sided advance in which mechanical invention and scientific scrutiny have played equal parts.[2] Owing to this thorough investigation, the application of the Diesel engine to road vehicles has reached the stage of commercial production in Germany.

The Diesel principle differs from the one used in carbureter engines, in that, air alone, instead of a combustible mixture, is

drawn into the cylinder on the suction stroke. This air is then compressed, during the compression stroke, to such a degree, that its temperature is raised above the ignition point of the fuel. The fuel is then admitted, in a finely atomized state through an admission nozzle, into the highly compressed air and in consequence of the temperature of the air it ignites spontaneously. Using this as a basis, the Diesel engine may be looked upon as a compression ignition engine in which the ignition of the fuel is entirely due to the heat of compression of the air into which it is injected.


THEORETICAL INDICATOR DIAGRAMS
Pressure
Volume
Adiabatics
(3,4)
5
6
2
3
4
(4,5)
Diagram No. 1
Heat added at constant pressure – peculiar to the slow speed heavy weight air injection Diesel engine.
Diagram No. 2
Heat added at part constant volume and part constant pressure – peculiar to the light weight high speed mechanical injection Diesel engine.
Diagram No. 3
Heat added at constant volume – peculiar to the carbureter engine.
1-2 Suction stroke
2-3 Compression stroke
3-4 Heat added at constant volume
4-5 Heat added at constant pressure
5-6 Expansion stroke
6-2-1 Exhaust stroke
J.F.D.

The theoretical indicator diagram adopted for the Diesel vehicle engine, lies between the true constant pressure diagram, used for the heavy weight slow speed Diesel engines, and the true constant volume diagram which is peculiar to the carbureter engines. If a constant compression ratio be assumed and the characteristics of diagrams varying from the true constant pressure cycle to the true constant volume cycle be computed, the following facts will be found. First, the greater the amount of fuel burned at constant volume, the higher will be the thermal efficiency, as would be expected, since more work will be derived from the expansion of the gases. Second, the mean indicated piston pressure will be proportional to the thermal efficiency. Third, the maximum temperature and pressure resulting in the cylinder will also increase as the constant volume diagram is approached. The best practi-

cable working cycle will evidently be the one which will give the greatest efficiency without incurring a too extreme maximum pressure and temperature. Mr. Huebotter states, that the most practical cycle will be found with 350 lb. per sq. in. compression pressure and a rise to about 700 lb. per sq. in. combustion pressure at constant volume, the rest of the fuel being burned at constant pressure.[3]

Within the last few years, there has been a large volume of work done in order to determine the exact stages in the combustion of heavy fuel oils in the high speed Diesel engine. It is extremely difficult to determine them experimentally, because the different phases overlap one another in point of time. The former prevalent theory that the combustion process consists of three more or less distinct stages (namely: first, vaporization and gasification of the fuel; second, ignition; third, combustion), has been generally abandoned. From recent research it appears to be more probable that no considerable amount of gas or vapour is formed before ignition occurs, as the available time is too short and the temperature at the instant of ignition is too low. On the other hand, it is likely that an envelope of air and vapour will form on the surface of the drop by the partial vaporization of the more volatile components of the fuel. This envelope has the lowest possible ignition temperature and consequently ignites first, thus producing a sudden increase in the temperature of the whole drop which then burns in the liquid form.[5]

Outwardly, the Diesel vehicle engine differs from the gasoline engine only in the substitution of the carbureter, spark plugs and wiring by a fuel pump, admission nozzles and the necessary piping. These parts are entirely new to the automotive industry and they have not yet reached the stage of standardization. It was not possible to adopt these parts directly from the slow speed airless injection stationary engine simply by proportioning their dimensions. Instead, it was found necessary to do some comprehensive theoretical and experimental research in order to determine suitable foundation for the designing of these parts and to construct practicable utilizable types. These researches are far from finished, but great progress has been made and many serviceable types of pumps and nozzles have been produced. The different types of nozzles will now be considered.

A fuel injection nozzle is required to produce as unbroken a jet as possible, together with the maximum penetrative power and fineness of atomization. The jet must also have a quick beginning and a rapid cut-off. It has been found through experiments that the penetrative power of a jet is increased by the use of long tapering channels, while the fineness of the spray or the degree of atomization is increased by short channels and suitable shapes of the nozzle outlets.[6] It follows as in many other engineering problems, that a compromise solution must be used.

The classification of nozzles can be made conveniently by dividing them first into two main classes and denoting them by

the words open and closed respectively. A nozzle belongs to the open type when there is no valve between the outlet valve of the fuel pump and the mouth of the nozzle. The closed type have the nozzle outlet controlled by a valve. The above two divisions can be further classified according to their cross section, as round hole nozzles, which are either single or multi-hole, slot nozzles and annular nozzles.[7] In many of the nozzles there is arranged a means of imparting a whirling motion to the fuel jet by means of spiral grooves. Each nozzle has its advantages and disadvantages and in many cases the types of nozzle used on a particular engine bears a direct relation to the performance requirements of the engine and to the design of the combustion chamber. The injection nozzle is a very important part of the Diesel engine and the different types will now be considered.

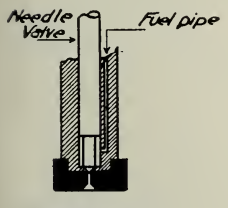


Diagram No. 4
Closed one hole nozzle

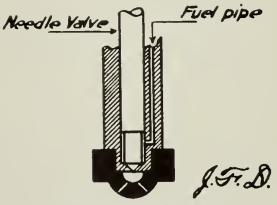


Diagram No. 5
Closed multi-hole nozzle

The diagrams, number four and five, illustrate diagrammatically two forms of closed nozzles which have their outlet hole controlled by conical needle valves.[8] These nozzles do not produce very good atomization, due to the very slight edge effect of the outlet holes, and for this reason are not likely to find extensive use in the high speed engines. However, they are specially characteristics of the development of the compressorless or "airless" Diesel engine.

A cross section of an open one hole nozzle is shown in diagram number six.[9] This type of nozzle has the advantages, that it can be easily and cheaply constructed, that the elimination of the valve removes a source of trouble, and that the air liberated by

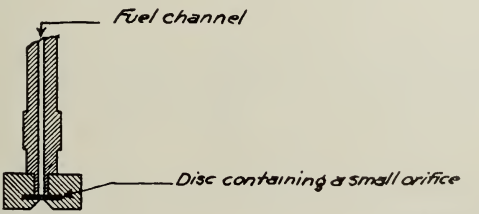
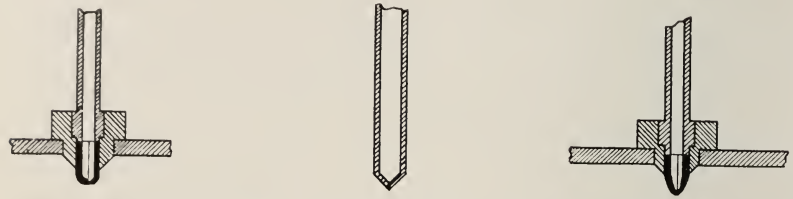


Diagram No. 6
Open one hole nozzle

the fuel is automatically carried off under all circumstances. The disadvantages are, that it may become clogged from the combustion chamber side by oil and carbon deposits, and that its small outlets are more liable to become obstructed by the impurities in the fuel than is a closed type. It is interesting to know that some of the leading firms are giving increased attention to the open nozzle, due to the advantages of this type which make it very suitable for small engines.

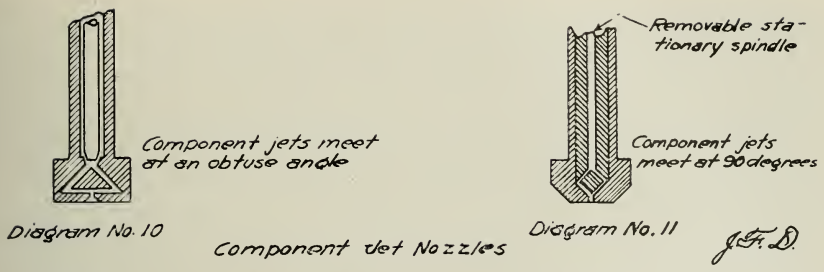


"Lip" or Elastic Deformation Type of Nozzles

The diagrams seven and nine represent two forms of "lip" nozzles which open through elastic deformation of the two symmetrical or unsymmetrical lips which form the nozzle tips.[10] The lips open as soon as the liquid pressure becomes great enough to cause elastic deformation and this allows the fuel to escape into the cylinder in the shape of a fan. Diagram number eight shows an experimental nozzle, which consists merely of a tube pressed together so as to form a narrow slot. The fan shaped jet emitted by this nozzle is finely atomized by the rectangular edges. It is evident, that the outlet cross section of nozzles operating on the elastic deformation principle is proportional to the injection pressure.

Another way to obtain good atomization is by dividing the fuel stream into two or more jets inside the nozzle and making these impinge on one another at the mouth of the nozzle. Even at moderate injection pressures the degree of atomization is very complete and much more satisfactory than that obtained with single hole nozzles at the same injection pressure. The diagrams number ten and eleven illustrate two types of component jet nozzles. The nozzle represented by diagram eleven incorporate the above principle in such a way that the two component jets meet at an angle of ninety degrees. The resultant of the velocity of the component jets is then in the direction of the emergent jet and imparts to the latter an excellent directional and penetrative force.

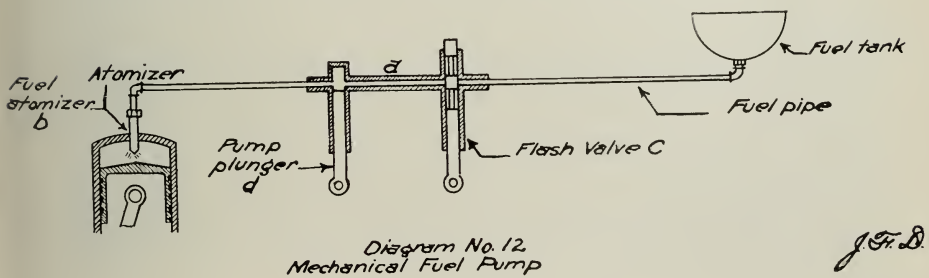
The open and closed nozzles both seem to be suitable for the light weight high speed engine. However, the question as to which kind is suited to a certain design of engine can best be determined on the test stand. It has been found that the choice



of a nozzle is closely connected with the size and shape of the combustion chamber as was mentioned before.

The fuel pump is equally important as the nozzle and this mechanism has presented many difficult problems to the Diesel engine builder. The magnitude of the difficulties becomes apparent when the duties of the pump are realized. A fifty horse power, four cylinder truck motor, requires the pump to deliver quantities of fuel varying from 0.00183 to 0.01037 cubic inches during each pump stroke. These small quantities must be accurately measured and injected at a pressure of about three hundred atmospheres (4500 lb. per square inch) without any considerable leakage at low pump speeds. There are other requirements such as simplicity and stability of structure, reliability of operation, and constructed so as to avoid any possibility of the admission and accumulation of air. The progress made in the design of pumps was the cause of the rapid advancement of the vehicle heavy oil engine. There have been several types of fuel pumps designed, three of which will be mentioned.

Diagram number twelve displays the principle of operation of one type of fuel pump.[11] The pump plunger (*d*) is operated by an eccentric and reciprocates the oil backwards and forwards through the passage (*b*). The flash valve (*c*) which travels at high speed, interrupts the passage (*d*) momentarily at the right time. This sets up a vibration through the column of oil lying between this valve and the fuel nozzle (*b*), which lifts the valve in the atomizer off its seat and forces a small amount of oil at



high pressure into the cylinder. When the valve (*c*) reopens, there is a reflex reaction and this draws the fuel nozzle valve back on to its seat and at the same time producing a sharp and effective cut-off.

Another type of fuel pump is shown in diagram thirteen. This pump uses a cam guided pump plunger which draws fuel in through the suction valve (*v*3) and delivers it to the injection nozzle by way of the delivery valve (*v*1). The effective stroke of the pump plunger is suddenly interrupted by the opening of the overflow valve (*v*2) at an instant determined by the governor. The discharge space is then short circuited with the suction pipe and the pump plunger is not able to deliver fuel to the injection nozzle during the remaining part of the stroke.

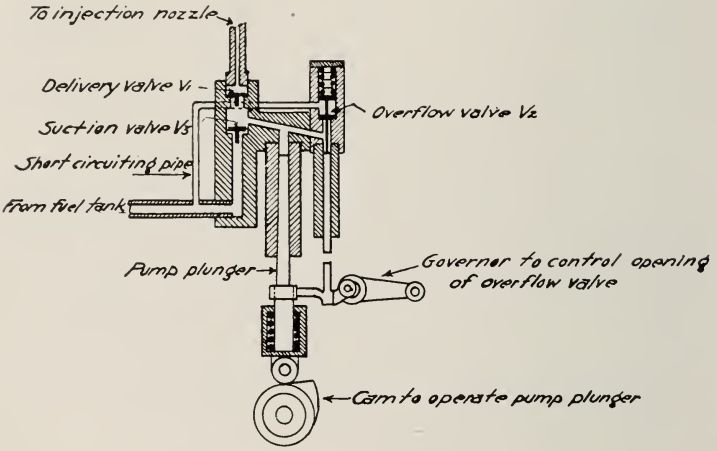


Diagram No. 13
Mechanical Fuel Pump with Overflow Valve J.G.D.

The fuel pump whose principle of operation is illustrated in diagram fourteen is a good example of the achievement made in pump design up to the present time.[12] An inlet valve for the fuel is eliminated by the use of a suction port (*s*). The discharge valves (*v*) which allow the fuel to pass to the injection nozzle are of simple and efficient design. The arrangement for varying the effective stroke of the pump plunger is of special interest. The position of the roller (*R*2) on the cam lever (*II*) is controlled through the guide link (*T*) by the governor shaft (*W*). This device makes it possible to control and vary the speed of the engine at will and pumps incorporating this means of control are especially adapted for vehicle engines.

Automotive engines are predominantly multi-cylinder four stroke engines, and for this reason it is the present day practice to enclose the individual fuel pumps within one housing and to use a common intake pipe.

The design of the combustion chambers for Diesel traction engines has developed along two main lines. One constructed so as to receive the injected fuel directly into the combustion space of the working cylinder. The other is arranged with an antechamber which is placed ahead of the working cylinder. The fuel is injected first into the antechamber and there partially burned. Due to the heat produced by the partial combustion, the pressure rises and drives the remaining fuel through ports into the working cylinder. Here it is burned as in the first type mentioned above. The two types of combustion chambers are shown in diagrams fifteen and sixteen. The main advantage of the antechamber type is that a much lower pump pressure can be used, usually a pressure of one hundred atmospheres (1470 lb. per square inch) is adequate

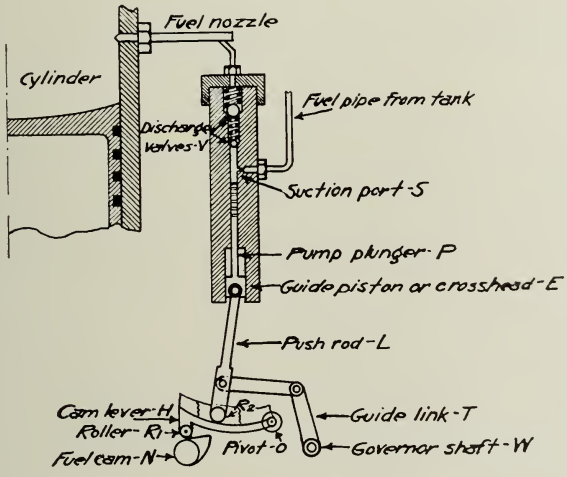


Diagram No. 14
Mechanical Fuel Pump

while three hundred atmospheres (4500 lb. per square inch) is common for the direct type.[13] However, a much more complicated cylinder head is required and the use of large inlet and exhaust valves is hindered . With the present development in fuel pumps the higher pressures necessary for the direct type can be easily handled and this type has the advantages over the antechamber method in that the cylinder head is more simple in construction and larger inlet and exhaust valves can be used.

Many valuable and interesting facts have been discovered about the light weight high speed Diesel vehicle engine. These facts followed from many experiments on this type of engine while on the test block and also during practical operating conditions on the road.

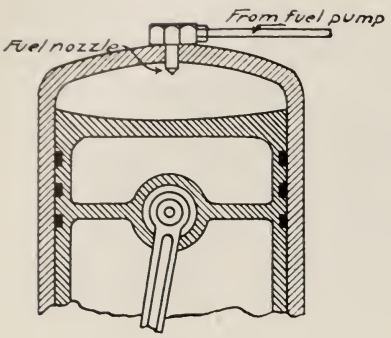


Diagram 15
Direct type fuel admission combustion chamber

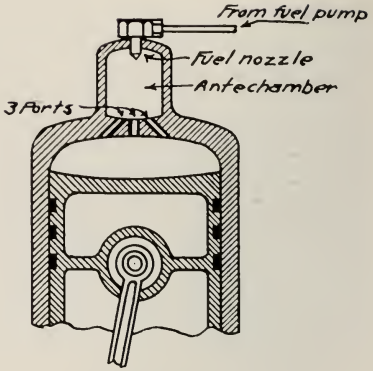


Diagram 16
Antechamber type combustion chamber

J.F.D.

A modern vehicle engine, working on the mechanical injection principle, is the light weight M.A.M. Diesel engine, which develops about forty-five horse power at a speed of one thousand revolutions per minute. This engine has four cylinders of 4.53 inch bore and a stroke 7.09 inches. The fuel consumption curves for different speeds are shown in diagram seventeen.[14] The fuel consumption

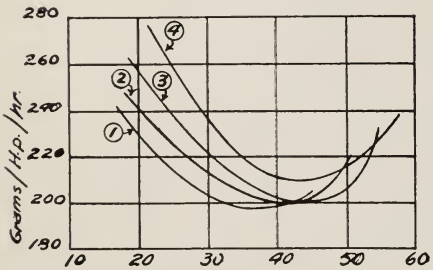


Diagram 17
Fuel consumption of M.A.N. vehicle engine

J.F.D.

at all speeds used ranged between 190 and 220 grams per horse power per hour (0.419-0.485 lb. per horse power per hour). These results are lower than the best values for gasoline engines. Compared with the carbureter engine the fuel consumption is very low over a wide range of partial loads, a fact that is particularly favourable for car propulsion, where very low and medium loads are frequent. Comparison of the fuel consumptions of a five ton Diesel truck drawing a five ton capacity trailer and a carbureter engine of similar capacity is shown in the following table.

Loading	Road	Fuel Consumption		Consumption
		Diesel	Carbureter	Ratio $\frac{A}{B} \times 100$
		lb. per mile	lb. per mile	%
		A	B	
Full	Mountainous	1.77	2.84	62.5
Full	Level	1.24	1.95	63.5
Empty	Mountainous	1.42	2.31	62.0
Empty	Level	1.06	1.60	66.5

Fuel consumption of a five ton truck with a five ton trailer J.F.D.

Another feature of great importance for practical vehicle operation, is the fact that the torque rises as the speed falls. The electric series motor owes its wide application to traction work to this very property. The torque-speed curves shown in diagram eighteen were obtained on a 4.53 inch bore and a 9.09 inch stroke engine using a single spray nozzle. The torque curves shown below give some idea of the pulling power of the car with variable running resistance. The curves indicate that the torque increases ten per cent. while the speed drops about twenty per cent. without changing the throttle. It follows from this that temporary extra resistance frequently can be overcome without manipulation, and shifting into a lower gear can be avoided or at least delayed.

The Diesel automotive engine has been found to respond immediately to a change in throttle. This quality is indeed valuable, in that, it makes this type of engine easy to control. Since nearly the same weight of air is available for each stroke, this engine can develop power corresponding to the quantity of fuel injected and and for this reason it will respond promptly to the driver's will.

A great deal of experience has been gained with the use of the Diesel vehicle engine in Germany. It has been found that this type of engine has excellent driving characteristics, due mainly to the far less need of manipulation. This feature is of special value when driving through hilly or mountainous regions. A test trip between a Diesel powered truck and two trucks with substantially larger gasoline engines showed that the average speed of the Diesel truck was the same as that of the gasoline engines. The advantage of the more powerful trucks on the level stretches was invariably more than overcome by the Diesel engine truck on the hills.

The reliability of vehicles propelled by Diesel engines has also been proven in practice. Experience obtained with about one hundred trucks thus far put into actual service driven by M.A.N. engines, indicate that they have met fully the requirements of running and traffic conditions and leaves no doubt that this type of engine is the equal to the highly developed carbureter engine. An example will show the sturdiness of these engines. A firm in Germany is running three five ton Diesel trucks, the first of which

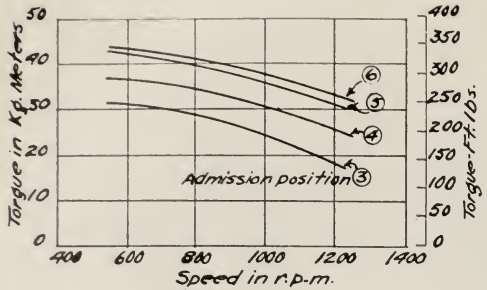

Torque in Kg. Meters
Torque-Ft. lbs.
Speed in r.p.m.
Admission position
Note: Each curve was made with no adjustment of the setting for quantity or time of oil admission. Each curve corresponds to one setting of the throttle lever.

Diagram 18
Relation between torque and speed for a Diesel vehicle engine of 4.53 in. bore and 7.09 in. stroke.

has travelled 27,962 miles, mostly with a five ton trailer, with no extensive overhauling, although it is operated under heavy duty conditions, making long trips into the foot hills of the Alps. Another example from nearer home indicates the fuel economy. The truck on which the tests were made has a total weight of five and three quarter tons and a load capacity of five tons. The engine has a bore of 4.5 inches and a stroke of 7 inches. The fuel-oil consumption in New York traffic was found to be one gallon for each ten miles. During a recent test drive of twelve hundred miles with the same truck, carrying a load of two tons, the average mileage was 11.6 miles per gallon of fuel. From half load to full load the fuel consumption was observed to remain almost constant, averaging 0.45 lb. per brake horse power per hour.

The future development and progress that can be expected of the light weight high speed Diesel engine are difficult to predict. An idea, however, can be formed from the personal opinions of authorities on this class of engine. It seems that the likely future development can be divided into three periods, immediate, near and remote, and the probable possibilities assigned to the period in which they may be expected.

The extensive adoption of Diesel powered motors for vehicles, which are used for regular service such as on motor trucks and bus lines, can certainly, from all indications be expected in the immediate future. It is to this class of transportation, where the cost of operation is a major consideration, that this type of engine offers at present the greatest economies. These savings are due to its high thermal efficiency and to its ability to use cheap heavy oils for fuel. The reduction in the fire hazard both during operation and while stored in the garage is also of importance. It is evident that the cost of fire insurance will be lowered when gasoline is replaced by heavy oil.

The development of the two stroke light weight high speed engine and the extension of the Diesel engine to aeronautics and pleasure vehicles will probably take place in the near future. The

Diesel principle is admirably suited to the two stroke cycle, as only air is present in the cylinder up to the point of admission of the fuel. When the piston uncovers the exhaust ports, as in two stroke cycle engines, the products of combustion can be cleared out in the usual way with scavaging air and then everything is ready for the compression stroke. The difficulty of clearing the exhaust products with a charge mixture or by scavaging air followed by a combustible mixture with the consequent loss of fuel out the exhaust ports, as in the two stroke cycle gasoline engine, is entirely eliminated. This would make it possible to develop almost double the power from the same weight of engine. An engine of this kind would indeed be of service for aircraft because of the high thermal efficiency and the reduction in the fire hazard.

The remote future may hold in store the development of a Diesel engine working on the two stroke cycle and with the further improvement of being double acting, applicable to land, air and water vehicles. This would make possible the manufacture of pigmy engines which would develope large powers in respect to their weight and size.

References

[1]Internal Combustion Engines—Ricardo, Vol. 1, p. 425.
[2]Automotive Industry—Vol. 57, page 416.
[3]S.A.E. Journal—Vol. 22, page 523.
[4]High Speed Oil Engines For Vehicles—Ludwig Hausfelder, Technical Memorandums No. 397, page 21.
[5]Technical Memorandums No. 403—Ludwig Hausfelder, page 9.
[6]Technical Memorandums No. 410—Ludwig Hausfelder, page 4.
[7]Technical Memorndums No. 410, page 4.
[8]Technical Memorandums No. 410, page 5.
[9]Technical Memorandums No. 410, page 9.
[10]Technical Memorandums No. 410, page 8.
[11]High Efficiency Oil Engines—Allan E. L. Chorlton, page 358.
[12]The Light Weight High Speed Diesel Engine—Kurt Neumann: Technical Memorandums No. 467, page 22.
[13]High Speed Automotive Diesel Engines—Dr. Riehm: S.A.E. Journal, Vol. 22.
[14]S.A.E. Journal, Vol. 22—High Speed Automotive Diesel Engines.

The Technical Service Council

By Lt.-Col. R. E. Smythe, D.S.O., M.C., B.A.Sc.

Early last summer the Technical Service Council opened offices at No. 15 Queen's Park, and actively undertook the work of liaison between industry and technical institutions. Studies were made of methods employed by large corporations in assimilating the recent graduate, and also the procedure followed by several large universities in placing their graduates and undergraduates. These studies, combined with statistics covering the occupations of graduates, are forming a basis upon which policies governing our future endeavours will be built.

Economic conditions in Canada have developed considerably during the past year. Business generally, and the number of men employed, have increased, and this growth directly concerns the technical graduate as it greatly enlarges the market for his services. This spring practically every graduate has a position awaiting him. A number of these men are going to industrial plants where technical men have not been employed before. These industries are giving the technically trained man a trial and are looking to him—firstly—to learn the intricacies of their business and to aid in the solution of technical problems, and later, to carry responsibilities not only of a scientific but of an administrative nature.

The Council have for their first object, "To retain for Canada young Canadians educated along technical and scientific lines". Canada at this time needs her graduates. This is evidenced by the fact that during the past nine months demands for more than four hundred men with technical training have been received at the Council's office. Forecasts indicate that this demand may be exceeded during the coming twelve months. The population curve of the Dominion is rising; business and industry is expanding—and this expansion will need leaders, not only in equal but in greater proportion, to guide and develop its growth.

There is another factor to be considered here. Canada is a large country, its resources are unbounded, its opportunities are unlimited; who is going to guide its development during the next fifty years? Who is as well fitted to be the leader and organizer as the graduate of the Schools of Practical Science? Business and industry are made up of men; conservation of the empire's best men is of vital importance to its future, and it would appear to be our duty to apply the best brains of the nation to the absorbing problem of its future.

The second object of the Council is "To bring graduates of universities and technical institutions into practical contact with Canadian industry". The Council are endeavouring to indicate to industries and industrial leaders the potentialities of the young man with technical training. They are endeavouring to point out the training

the graduate has received and its possible application to the production and management of business enterprises.

Also the Council aims to bring all available information to the aid of the young man about to choose his life work. Usually a student chooses engineering because of its natural appeal, but in this age engineering is a broad field and embraces nearly every known industry as well as consulting practice and therefore decisions must be made as to what department of engineering is to be studied. It is often said that a university training is fundamental, and this is true in a very wide sense, but the course studied and the subjects specialized in are the definite boundaries of the graduate's future field of work. It therefore follows that information concerning the possibilities of the various industries should be well considered by the student, in addition to a serious consideration of his natural inclination and aptitude for the type of work involved.

The Council during the past nine months have consistently recommended the employment of undergraduates during the five month vacation period each summer. In making this recommendation they have been influenced by two, perhaps three, considerations; namely the points of view of the employer, the student and the teacher.

From the employer's viewpoint it is sometimes very difficult to make a place for the student for five months only, but there are advantages to be gained which may outweigh this difficulty. The employer has the advantage of giving a man a trial to ascertain his adaptability for that particular industry, and an opportunity of judging his abilities and character. The employer also has an opportunity of giving the prospective permanent employee a thorough training in the fundamentals of his business at a fairly low cost, and he reaps the benefit of having the student take up special options in his university course along the line of his future work. This policy has further value in that it tends to make the graduate a producer early in life, and being a producer he is also a consumer and buyer of manufactured products.

From the student's viewpoint it leads to his making a decision as to his life work earlier; because he cannot expect industries to employ and train men only to have them leave to enter another industry the following year. He gains practical experience which balances the theoretical learning at school, and also gains information enabling him to choose options with direct purpose. He gains experience in co-operation with skilled workmen, and learns the value of tact and the importance of rapid and thorough work. He also gains knowledge of the industry.

Incidentally we would mention at this point that care should be taken by the student who has worked for a certain industry to avoid a too hasty comparison of the opportunities it affords, with those apparently offered by other industries. His basis of comparison must necessarily be one-sided, and the frequent changing of positions which sometimes results has been proved by experience to be unwise.

From the teacher's viewpoint this policy would appear to be an advantage, and some universities in the United States have co-operative courses which appear to work admirably. The summer experience tends to create a greater and more intelligent interest in the subjects taught, and the "casualty list" is reduced as the value of knowledge is more clearly understood. The fact that there is a particular industry interested in a student's work has proved to be a strong incentive to him.

The third object of the Council is to submit to universities the recommendations of industry concerning scientific courses.

Acting in the capacity of obtainers of specialized personnel for industry, the Council's staff have an opportunity of compiling statistics as to the requirements of industry in this regard. Obviously higher education, quite apart from its cultural value, should equip a man with training for his future work, and it therefore follows that information concerning the needs of industry for such training should be transmitted to the educational institutions. The Council's work in this way should be of benefit in bringing the enormous cost of education into direct relation to the expansion and growth of the country.

The fourth object of the Council is to aid industry in technical and scientific employment problems. During the past eight months the Council have conducted a central employment office and have endeavoured to put industry in contact with the men of technical training who are suited to their needs. It has also worked inversely; obtaining for graduates and undergraduates positions of the type best suited to their adaptability and qualifications. The results of this work have been most interesting and should in time bring about a reduction in the flux that naturally follows when men accept jobs without consideration of their suitability, and without knowledge of other opportunities.

During recent months two questions have frequently been asked by students and others. They are important questions, and we should like to offer the following comments regarding them:

(1) Is scholastic achievement an index of ability?

There are many graduates who contend that it is not, and they even quote men who have failed in college and achieved financial success later in business ventures. However, within recent years the American Telegraph & Telephone Company have conducted a study of their employees which gives the opposite opinion. They have found that those who stood in the upper tenth of their class scholastically have on the whole been most successful both financially and in attaining responsible positions. Next to them come men of the upper third, and those who have made the poorest showing are found in the lowest third. It may be viewed in another light; is it not reasonable to suppose that the calibre of the work done by a man between his nineteenth and twenty-third years is indicative of what he will do for the next ten years? There are of course exceptions; certainly the young men who carry the load of college

activities such as Engineering Societies and Debating Clubs and so on, cannot give the same amount of time to their studies as can the non-participant in these interests. On the other hand these duties develop other abilities and tendencies which should be considered along with scholastic attainments, and these are weighed very carefully by the representatives who employ men for large firms.

The other question is—What type of men are industrialists seeking?

The employer rarely obtains as competent a man as he wants. Some employers seek men of immediate value; others, men having the potentialities to become valuable employees after training. However, it is most noticeable that character and ability are the factors which influence employers perhaps even more than scholastic attainments, although it is true that they generally go together. Character factors, such as dependability, industriousness, patience, persistence, cheerfulness, adaptability and sincerity are primary considerations. Ability factors, including the capacity to make decisions, to organize, to co-operate, to be tactful, to speak and write clearly and convincingly, together with good health and a neat appearance, are factors which the employer seeks and it is on these, together with the ability to obtain results, that he bases his judgment.

In conclusion the Council invite the co-operation of student, graduate, staff, and industry generally, in the forwarding of their objects, and they take this opportunity of wishing the class of 1929 success in their life work. They also wish to express their appreciation of the assistance given them by the Dean and members of the Faculty staff, and of the prompt and business like co-operation of the class of 1929.

A Year in Europe

Robert W. Angus,
Professor of Mechanical Engineering

Through the generosity of the Board of Governors of the University I have been allowed a free year after thirty-two years' service in the Faculty of Applied Science and Engineering. I had long ago decided that, if I ever had sufficient freedom, I should make a prolonged visit to Europe to study the conditions, and compare them with those on the American Continent, and this has been my first opportunity.

My earlier visits in Europe, made before the war, showed developments in gas engines, water turbines and pumps, and many other lines from which we could well learn many lessons. At that time the designs, and in many cases the machines themselves, such as our newest water turbines, came from Europe; producer gas engines had made little advance in America, although very common in England; while the Diesel engine was extremely rare in America although many had been put in successful operation by Swiss and other firms. With these facts in mind I was very anxious again to study engineering matters further, after twenty years' progress on both sides of the Atlantic.

The first part of the year was spent in London, where I was fortunately located near the very interesting and instructive South Kensington Science Museum. This has recently been moved into new quarters and contains many of the original Watt models, and early examples of the steam engine, with a replica of Watt's workroom and his model making and other tools. There are also many other originals there of boilers, locomotives, and all such devices which delight the scientific eye and give one a fine picture of what has been done in a hundred years.

But I pass on immediately to my visit to the Continent, which began in September. There are so many hydraulic problems demanding our attention in Canada that I made it my special business to see how such work was being attacked overseas, and my first point of interest was Holland. Here, of course, they have no water powers, but I found in Delft a most interesting laboratory for studying the flow in canals, and in which very many problems had been under consideration. One that greatly interested me was a study on a canal that crossed a channel affected by the tides, and the laboratory was working out details of a scheme that would allow the ships to pass through this tidal water without being battered against the one side or the other, irrespective of how the tide was running.

This institution at Delft was part of their fine Engineering Department, and I found there very fine equipment in all branches of engineering and a well trained staff, the whole institution com-

paring very favourably with any I have seen elsewhere in Europe, or America.

Germany, of course, possesses many fine examples of such laboratories, and has used them most effectively in developing the country, and they have very frequently been employed by other nations in solving their problems. For example, models of the great Shannon River, Ireland, Hydro Electric Station and its accessories were tested in Berlin, and Professor Rehback, in Karlsruhe, told me that many outside governments and private companies had had him make experiments for them. The great laboratories in Berlin (Charlottenberg and Marguardt) show the importance the Germans attach to the work of the laboratory and I only wish our own people were a little more alive to the opportunities it affords.

Space does not permit me to say anything of the experimental facilities in Munich, Dresden, Karlsruhe, Hanover, etc., but I must not fail to mention the excellent laboratory being made near Munich, through the co-operation of the German and Bavarian Governments and also the private power companies, all of whom realize the amount to be gained by this means.

Switzerland has always done much in the technical line, but I think I was more surprised in Italy, than anywhere else, by the fine Engineering School and laboratories recently completed in Milan. All of the countries of Europe have been doing a great deal of railway electrification since the war, and progress in hydraulic plant construction has been extremely rapid. Italy again was most interesting from this point of view and has done much in the way of new and original development.

What I have said of hydraulic laboratories applies to other branches of engineering as well. Industrially these countries have been of equally great interest, for the war left them with very large shops with insufficient work to fill them, and so they have had to meet a problem we have felt very keenly at home. One can hardly realize the extent of the enormous shops in Germany, Czecho Slovakia, Austria, Switzerland and Italy, these shops being employed in steam and water turbine building, the construction of pumps, boilers, pipe lines, Diesel engines (perhaps the largest single industry) bridges etc., and so far as I could judge they were all fairly busy.

I am just now starting my visit through England, and am, in fact, writing this article in Cambridge, but so far as I can learn they are suffering somewhat here from a rather poor industrial state of affairs and business is said to be rather depressed. This, added to the very heavy taxes paid in Britain, makes a heavy load to carry and makes the cost of living very high here, my own feeling being that it is much higher for the same service, than elsewhere in Europe, and some of my friends have said that it was costing them more to live in England than it had done to live in the same way in Canada.

The more I have seen of this Continent with its multiplicity of problems and complications, its crowded conditions, its variety of languages, monies, etc., the more I am thankful that I live in Canada where there is so much opportunity for the young man of energy and ability, where English is the universal language, where you can buy things in pounds weight and do not have to be mathematician enough to reckon them up in stones and to calculate their values in pounds, shillings and pence. Canada is truly a land of promise and those of us who are fortunate enough to live there are facing the rising sun and it should stir the blood in us to make us heed the call to service. Europe is a great country to see, there is much to learn here, and there are many prejudices that we lose with greater acquaintance but Canada is dearer to my heart than ever and my own University means more to me for the year's absence.

The Engineer Mind

*By The Honourable William Renwick Riddell, B.A. (1874), B.Sc. (1876), LL.B. (1878), D.C.L., F.B.S., Edin., F.R.H.S. (London), F.R.S. Can. &c.

The Engineer is always engaged in applying the raw materials of Nature and her forces to the advantage of mankind; he is always engaged in a game with Nature—she is always perfectly fair but always inexorable; she does not cheat, but she does not allow a move to be taken back. A new move, indeed, may in whole or in part retrieve a mistake but the move and the mistake must stand without recall.

> The moving finger writes and having writ,
> Moves on; nor all your piety and wit
> Can call it back to cancel half a line,
> Nor all your tears wash out one word of it.

The Engineer sits on the other side of the table; and it is his part to know the pieces he is moving and the rules of the game. Not yet, if ever, does anyone know the full potency of Natural material and forces, nor yet, if ever, know all the rules of the game. The player may know some of the pieces and their value, some of the rules; he will make mistakes, but must make the best of what he knows. He must, however, *KNOW*—faith, belief, have no place in his play.

Consequently, the Engineer is a votary of the god of things as they are; and must worship at his altars, alone.

It is a distinct misfortune that the word "engineering" has acquired in some connections, a connotation of cunning, trickery and scheming; the Engineer is and must be the embodiment of the very opposite of this; he has no room for trickery, he must be honest with his material and straightforward in his treatment of it—there is no room for trickery, and any attempt at it is immediately discovered and speedily fatal.

The Engineer-Mind, then, contemplates everything in its actuality; it may, indeed, wish for, hope for, look for, more than appears on the surface—for the true Engineer is always trying to discover the unknown potentialities in order that he may advance—but he must see what actually does exist, and act accordingly; he must not, because he suspects that there is something more than is on the surface, refuse to see what is on the surface—it may be but part of the truth, but it is the truth.

---

*The Honourable Mr. Justice Riddell, Justice of Appeal, Supreme Court of Ontario, who proudly claims to be the oldest living Graduate in Engineering in Canada, was made an Honorary Member of the Engineering Society in October, 1928.

And truth is the same everywhere and at all times; it is not modified by prejudice or passion, political or national feeling. When HCl is poured over $CaCO_3$, CO_2 is formed, whether in Toronto or Timbuctoo, Petrolia or Patagonia, and whether it is Christian, Mohammedan or Pagan who tries the experiment; and neither Bible, Koran nor Rig Veda has the slightest effect on the result.

The Engineer-Mind is called for in all conditions of life; he who sees things as they are and calls them by their right name is a valuable asset to every community. It is not too common—there is still in the House of Commons, a Member who wished to have the House rebuke a Canadian speaker who said that the British Constitution was a magnificent piece of camouflage; although everybody knows that the fact is so, and only the terminology was novel. A newspaper in Toronto threatened a Canadian speaker with vengeance, because he said that in the various self-governing parts of the British Empire, a Ministry, responsible to the people of that part of the Empire, directed His Majesty or his Representative how the country was to be governed, although that was a mere commonplace and the boast of our Empire for years—not by one political party alone but by all, the only dispute being which party should have the credit of bringing that state of affairs about. I have been received with dubious shakes of the head when I asserted, and, as I thought, proved that this state of government of the various parts of the British world was implied in a decision of the Courts in England, more than three hundred years ago, and said that if the principle of that decision had been kept in mind and heeded, there could have been no American Revolution, no Mackenzie Rebellion. The Engineer-Mind in the field of statesmanship would have prevented these and countless other troubles.

In other fields, the Engineer-Mind is equally valuable. For example, there are diseases afflicting thousands of our countrymen and countrywomen, in some cases by their own fault, but in countless cases destroying the innocent; and because the subject is not a pleasant one, most of us close our eyes to the peril; we will not see things as they are; we blink facts, we try to play tricks with Nature, and thousands die every year who by an honest facing of plain fact would have been saved. Our politicians, our Governments, to a great degree decline to confess the real situation and to apply proper and acknowledged remedies. Nor can fault be found with politician or Government—no politician, no Government, can be much in advance of his constituency, their people; and until the people are awakened, not much can be accomplished. Give the common people the Engineer-Mind, let them see things as they are, acknowledge and act upon the things as they are, and the Millennium of Health is not far distant.

In private as in public life, we are all prone to accept the traditional Shibboleths—we see things through the eyes of past generations—the "wisdom of our forefathers" is constantly brandished as our proper banner, forgetting that our forefathers were the

people of a less advanced stage, and that we have the advantage of not only their experience but also of much else which they did not have; and if we cannot take advantage of what they did not have, we should hide our heads in shame, and acknowledge ourselves degenerate and unworthy of our lineage. The authors of Magna Carta, of the Star-Chamber Act, of the Bill of Rights, of the Reform Bill, were not bound by the existing and past views of right; the Dominion of Canada was a new experiment in the British Empire; *vixere fortes ante Agamemnona Multi,* indeed, but also *vixere et vivunt fortes post Agamemnona multi;* and the breed is not extinct. Why not in politics, Canadian, Provincial, Municipal, in the field of law, health, commerce, education, in all the fields of human activity, apply the Engineer-Mind, see things as they are, and disregarding past prejudices, act honestly and scientifically in view of the actuality? This way lies progress—lies National, Provincial, Municipal, Social progress—lies progress true because built on solid and immovable foundations.

An Editorial

*By Professor H. E. T. Haultain, C.E.

E. W. Beatty, President of the Canadian Pacific Railway, in an address before the American Railway Association, said:

"Within the last half century the North American Continent had grown to be as much an industrial and commercial as an agricultural country and for this, the engineer was largely responsible. The fear had been expressed that with 12,000 men holding engineering positions in Canada, the universities were turning out too many qualified engineers for the country to absorb. To his mind the answer should be that, if so small a body of men had achieved and was continuing to produce so vast a transformation, the greater should be the effort to find employment and opportunity for all the men of that type the universities could turn out."

A Committee of the Engineering Alumni of the University of Toronto reports that it costs the province on an average $2,000 for the university education of each graduate in engineering and that 10 to 15 per cent. of these graduates, generally the best of them go annually to the States. These get better pay and more rapid advancement than those who stay in Canada.

The University is one of the best efforts of the State. It is a successful effort; its standards and its attainments are recognized as of the highest throughout the world. The University takes a selection of our partly processed finest natural material, our young men and women, and processes it still further, presumably for the benefit of the nation. For the manner and methods of this processing the whole world is drawn upon and we are justified in believing that the results are the best obtainable for laying the foundations for the filling of the highest as well as the every day needs of the nation. So much is this taken as a matter of course that the product is expected to sell itself, a condition of affairs very different from other production.

The very essence of modern operation is selling. Even the profoundest of truths must in these days be sold, expertly sold, or they are not absorbed or assimilated. This selling has become such a universal, such an insistent, all pervading process that where it is absent there is no progress. The public does not recognize value in goods or in ideas unless there is insistent publicity in selling. The use and meaning of the word have changed as well as increased. Not only are goods sold but the man is "sold". A man must be sold on the value of a car before he buys the car. The nation is not sold on the value of our educational products (and this includes

*This editorial comes from the pen of the first undergraduate President of the Engineering Society. In 1888 the late Principal Galbraith handed over the Society duties to Professor Haultain who was then attending the old School of Practical Science. Professor Haultain takes a great paternal interest in the Engineering Society and is always willing to give aid from his long experience.

the products of the Technical and High Schools as well as of the Universities) except in a very general way. We do not know these products nor their possibilities. Even the producers, the educationalists themselves, have probably but faint realization of their possibilities all along the line from junior assistants to, later on, general managers. The modern salesman develops more uses for his product than do the designing and production departments. There is no part of our commercial life that would not be improved by the development of the uses of this, our most complex natural product.

Is it not, perhaps, our greatest national need that employers be sold on our educational products?

"If" Again

By Robert Isham Randolph with apologies to Rudyard Kipling.

Courtesy—The Queen's Journal

If you can swing an axe or wield a bushhook,
Or drive a stake, or drag a chain all day
If you can scribble "figgers" in a notebook,
Or shoot a range pole half a mile away.
If you can sight a transit or a level
Or move a target up and down a rod,
If you fear neither man nor devil,
And know yourself and trust the living God;

If you can wade a swamp, or swim a river,
Nor fear the deeps, nor yet the dizzy heights,
If you can stand the cold without a shiver
And take the Higgins ink to bed at nights,
If you can turn a thumbscrew with your fingers
When every digit's like a frozen thumb.
If you can work as long as daylight lingers
And not complain, nor think you're going some:

If you can sight through tropic heat's refraction,
Or toil all day beneath a blistering sun.
If you can find a sort of satisfaction
In knowing that you've got a job well done.
If you can be an eskimo and nigger
And try to be a gentleman to boot.
If you can use a "guessing" stick to figger
And know a coefficient from a root:

If your calculus and descriptive are forgotten,
And your algebra just serves you fairly well.
If your drafting and lettering are rotten,
And your Trautwine's always handy by to tell.
If you can close a traverse without fudging,
Or check a line of levels by a foot.
If you can set a slope stick just by judging,
And never kick a tripod with your foot:

If you can run a line where you are told,
And make it stay somewhere upon the map.
If you can read your notes when they get cold,
And know that contours mustn't ever lap.
If you can line a truss or tap a rivet,
Or make a surly foreman come across.
If you can take an order, as well as give it,
And not have secret pity for the boss:

If you can climb a stool and not feel lowly
Nor have your head turned by a swivel chair.
And if you can reach your decisions slowly
And make your rulings just and fair.
If you can give yourself and all that's in you,
And make the others give their own best too.
If you can handle men of brawn and sinew,
And like the men and make them like you too:

If you can't boast a college education,
Or, if you've got a sheepskin, can forget.
If you can get a living wage for compensation,
And give a little more than what you get.
If you can meet with triumph and disaster
And treat them without favour nor with fear,
You'll be a Man—and your own master,
But what is more—you'll be an engineer.

ENGINEERS

THE

YEAR BOOK

of the

University of Toronto Engineering Society

Faculty of Applied Science

1929

H.C. ROSS
CIVIL REP.
L.F. COCKBURN
ELECTRICAL REP.
D.F. McCARTHY
VICE PRESIDENT
A.W. DAVISON
PRESIDENT
H.T. PRITCHARD
MECHANICAL REP.
H.P. SMITH
W.H. de MONTMORENCY
CHEMICAL REP.
L.C.H. JENKINS
TORONTONENSIS REP.
DEAN MITCHELL
FOURTH YEAR
EXECUTIVE
FACULTY
OF
APPLIED SCIENCE
AND
ENGINEERING
1928 U of T 1929
G.R.L. LORD
SEC. TREAS.
M.B. FORBER
ATHLETIC ASSOCIATION REP.
C.H. HOPPER
MINING & METALLURGICAL REP.

Engineering Society Elections

Following the change in the elections act which was instituted last year, the traditional School nomination meeting was not held this year. The tamer but perhaps more efficient system of written nominations was the order of the day, and Monday and Tuesday the Engineering Society office was deluged with nominations for every available office in the Calendar, and even for some not fortunate enough to be graced by denizens of the little red school house.

The election meeting was held on Wednesday in C 26 where the respective candidates addressed, or endeavoured to address the Electoral body gathered there. This year, however, the frosh candidates seemed to have better sense than to appear in bow-ties and spats, consequently there were no serious casualties.

For the next several days the candidates waged their respective campaigns, aided and abetted by the time-honoured blotters and posters. Some candidates moved their majestic way indifferent to their nomination; others brazenly solicited support while the architects reaped a golden harvest through their artistic sign-making prowess. The elections, however, were more or less free from the bribery and corruption of cigarettes and candy offered at other prominent faculty elections.

As the election day approached, each year held its own meeting at which the candidates presented their credentials. The most outstanding of these meetings was held by the graduating year at which the would-be permanent executives appeared on parade.

Friday, the election day, dawned as almost every other Friday. Its first gray streaks illumined a sacreligious sight—the fence in front of the august medical building had, as if in spirit of the greatness of the day, decked itself with the blue, white and gold colours of the best faculty. Great was the rage of the budding medicos when they beheld this atrocious act—but their cup was not yet full, as the noon-hour brought more offensive and heinious doings.

Luncheon was held *ex-consuetudine* in the Great Hall, after which East Common room was appropriated. Some there were who questioned School's right to this room, but by physical persuasion all disputes were settled. During the course of the noon-hour, impelled by some unseen hand, the cannons at Hart House, silent for many years, belched their salute to this auspicious occasion. During the parade to the polls it was found expedient by some of the more timorous in the building to the north of the campus to keep the big oak doors bolted during the passing of the procession. Also about this time the magic letters S.P.S. appeared in flaming red on the Med. sidewalk, much to the mystification of Scotty and his cohorts.

The poles opened early, in order to give early results, and since, in a Schoolman's opinion, a trip to a downtown theatre always follows the voting, the attendance at Sheas and the Empire was considerably increased that afternoon. The passing of the Gayety

Engineering Society Store

was undoubtedly mourned by many, but in spite of this, the afternoon was quite successful.

Night found the electoral body assembled in the second year drafting room, where the results were flashed on the wall for those who could interpret them. During intervals of waiting, the usual fetes of strength and skill were indulged in, and the usual repast of cider, sandwiches and crackers was dispensed. About ten-thirty "the tumult and the shouting" died and the party dispersed, filled with the righteous knowledge of a good deed well done.

JOHN R. WHITE,
3T0.

Election Results

ENGINEERING SOCIETY

President ..... G. H. McVEAN
1st Vice-President ..... G. M. MASON
2nd Vice-President ..... A. E. TYSON
Secretary ..... I. K. CHALMERS
Treasurer ..... D. H. TRAYNOR

ATHLETIC ASSOCIATION

President ..... J. E. R. WOOD
Vice-President ..... E. A. PEAKER
Secretary-Treasurer ..... P. A. BALLACHEY

CIVIL CLUB

Chairman ..... R. C. McMORDIE

M. & M. CLUB

Chairman ..... B. G. W. ROBINSON

ARCHITECTURAL CLUB

Chairman ..... J. F. GREEN

MECHANICAL CLUB

Chairman ..... H. J. MUIR

ELECTRICAL CLUB

Chairman ..... B. DE F. BAYLEY

CHEMICAL CLUB

Chairman ..... R. M. FERGUSON

2T9 PERMANENT EXECUTIVE

President ..... A. W. Davison
Vice-Presidents ..... J. D. Wright
J. M. Goss
J. L. Davenport
K. F. Tupper
J. T. Dyment
Secretary-Treasurer ..... J. F. Durnan

CLASS OF 3T0, FOURTH YEAR

President ..... G. R. Armstrong
Vice-President ..... J. C. Edmonds
Secretary-Treasurer ..... E. T. Burns

CLASS OF 3T1, THIRD YEAR

President ..... J. R. White
Vice-President ..... J. W. Franklin
Treasurer ..... A. R. Saunders

CLASS OF 3T2, SECOND YEAR

President ..... E. S. Jewett
Vice-President ..... E. A. Black
Secretary ..... J. L. Donaldson
Treasurer ..... R. B. Bryce
Athletic Rep. ..... F. S. Lee

Permanent Executive

Four years ago we were looking forward—forward to something of which we knew little. Now it has come and gone (almost). We are just about to close the book on our college days. To say that our lives have been influenced is entirely unnecessary. We have been subjected to a certain amount of instruction. Many of us have excelled in, or at least taken part in, some form of athletic endeavour. Socially—well, I think the answer to that was the graduation dance, not to mention countless other affairs. These things have been important factors in the moulding of our lives. But we cannot fully sum up our university careers thus. There is something else, and something which we believe to be as powerful a force as any of the preceding ones outlined. I speak of the associations we have made, particularly in our own year. We have been united in a common bond these four years. We have worked together and played together and who will say we are not the better for it? But after graduation, what? Will these bonds be broken or will we carry on together? Naturally we cannot exist as a physical body, but we can exist as 2T9 by means of indirect contact through the Permanent Executive.

We on the executive appreciate the honour and responsibility you have invested in us. We are anxious to keep 2T9 alive. May we be likened to a telephone exchange—the link between you and your fellow graduate? We want to hear from you and we want to be the means whereby you can keep in touch with others. Let us all bear this in mind and make use of the addresses listed below.

It is the old story over again. The more one puts into a thing, the more one gets out and we cannot help but feel that a great deal is to be gained by the perpetuation of 2T9 in years to come. Will this be one more achievement for the year? It rests with you—and us.

We, the executive, wish everyone a bright future,—the success of which will reflect credit on the university, the faculty, and the year and which will stand—a monument to those years of preparation culminated in School.

A. W. Davison,
President.

J. F. Durnan,
Sec'y-Treas.
380 Delaware Ave.
Toronto.

Permanent Executive, 1929

J. D. WRIGHT

J. M. GOSS

J. L. DAVENPORT

J. T. DYMENT

K. F. TUPPER

F. J. DURNAN
Sec.-Treas.

The Passing of the Mechanical and Electrical Club

Twenty-two years ago a club was formed bearing the name of the Electrical Club. The minutes of its first meeting are still to be found amongst the records of the Engineering Society. That was the beginning of what is now the Mechanical and Electrical Club. At that time, we are told, there were not separate courses in Mechanical and in Electrical Engineering.

Fifteen years ago the Mechanical and Electrical Club was formed, presumably because two departments were now involved—perhaps to pacify the Mechanicals whose name was not being mentioned. From that time on the M. and E. Club has existed as it is to-day (except that from time to time certain people would try to call it the E. and M. Club).

To-day sees the passing of the M. and E. Club—it passes but it does not die, for it has split itself in twain. There will now be an Electrical Club and a Mechanical Club. The reason for the change was merely this, the M. and E. Club was too big, too unwieldy, too hard to manage. For years it has embodied more than forty per-cent. of the students in the Faculty—almost a competitor in size with the Engineering Society. We believe that two smaller clubs will be able to function much more effectively indeed than one large one.

The activities of the M. and E. Club last year were few perhaps, but large. There was the annual Fourth Year trip to Queenstown so that the boys could see what makes a power plant tick (or go to a show at Niagara Falls). Everyone had a good time, even to the pair who left their hats in the middle of the lake. Soon after that came a trip for all four years to visit the Westinghouse and Steel Company's plants at Hamilton. We visited there in large numbers, despite the absence of the Fourth Year Mechanicals who had a privately conducted tour of inspection of the Goodyear Tire plant in Toronto. Later came a smoker held at Hart House, at which we learned from Mr. Gordon Turnbull, one of our Grads., a great deal about Industrial Control. Lastly the most important activity of the year, the process of separation into two parts.

We hope that our twin offspring will flourish and prosper and carry on the good work of the old Club.

KENNETH TUPPER,
Chairman.

S.B. MOORE
3rd Year
Elec. Rep.
J.N. FRANKLIN
2nd Year
Mech. Rep.
PROF H.W. PRICE
Hon. Chairman
PROF J.H. PARKIN
Hon. Vice-Chairman
W.A. CAMPBELL
2nd Year
Elec. Rep.
J.F. MOORE
1st Year
Rep.
MECHANICAL
AND
ELECTRICAL CLUB
EXECUTIVE
Faculty of Applied Science
1928 — 1929
H.J. MUIR
Sec. Treas.
K.F. TUPPER
Chairman
L.F. COCKBURN
Vice-Chairman
H.T. PRITCHARD
4th Year Mech. Rep.

FOURTH YEAR MECHANICALS—1929

Rear Row—Strong, Pritchard, McIntosh, Sipes, Barnes, Dyment, Woodside, Lord, Olver, Parkin, Shiells, Furber.

Front Row—McCurdy, Durnan, Kelman, Peart, Professors Allcut, Taylor, and Parkin, Thwaites, Hewson, Cunningham, Wilson, Tupper.

Inset—MacDonald.

E.A. BLACK
H.A. KEE
A.E. DYMENT
G.E. SMITH
A.R. SAUNDERS
J.A. PATERSON
R.L. BULLEN
C.H. HOPPER
MINING
AND
METALLURGICAL
CLUB EXECUTIVE
FACULTY
OF
APPLIED SCIENCE
1928 U of T 1929

The Mining and Metallurgical Club

Following the precedent established last year the club secured a practising Mining Engineer to fill the office of Hon. Chairman. To Mr. H. A. Kee who honoured us by accepting this position our heartiest thanks are due for advice and assistance given the executive during its term of office.

Early in October a trip was staged to Buffalo. Some thirty members had the good fortune to make this excursion and were given an opportunity of visiting the Bethlehem Steel and Curtis Aeroplane Plants.

Mr. R. A. Bryce addressed the first formal meeting of the club, held at the Five Sisters Tea Rooms in November and gave some sixty members in attendance some good advice on a subject in which we are all interested—"How to begin practising our chosen profession".

We were fortunate in securing Col. J. E. Leckie to speak at our December meeting held in the Great Hall at Hart House. Col. Leckie gave a most interesting and delightful account of his adventures last summer in the Hudson's Bay country. The free-for-all discussion held after the meeting was enjoyed immensely by those who grasped the opportunity of putting their problems before a man of experience in the mining industry.

Mr Kee's talk on professional ethics was received by all with enthusiasm. The usual general discussion was held after the meeting and the barrage of questions to which Mr. Kee was subjected was ample evidence of the interest he aroused in his audience.

The last meeting of the club was an experiment and departed somewhat in principle from previous meetings. Mr. Balmer Neilly instead of giving a formal address, led a discussion on mine organization and management. Frankly speaking this went over with a bang and it is to be hoped that the experiment will be repeated next year.

In January the members of the club were entertained at a delightful Tea-Dance given by the Association of the Women of the Mining Industry. To this organization we wish to extend our heartiest thanks for the pleasure we experienced on this occasion.

In handing over the reins of office to the new executive, we have every confidence in the success of the club next year.

A. E. Dyment,
Chairman.

G.A.LEE
1st Year Rep.
W.H. MACARTNEY
2nd Year Rep.
G.M.MASON
Vice President
W.D.IRWIN
President
A.R.WALLBERG
3rd Year Rep.
W.H. de MONTMORENCY
4th Year Rep.
INDUSTRIAL
CHEMICAL
CLUB
EXECUTIVE
U of T
1928 — 1929
W. JENNER
Curator
PROF E.G.R. ARDAGH
Hon Vice Pres.
PROF J.W. BAIN
Hon Pres.
R.O. WILLIS
Sec Treas.

The Industrial Chemical Club

The academic year is rapidly approaching its welcome end and before closing our notebooks with a joyous snap (for some of us a final and not quite so joyous snap) let us briefly pass in review the various activities of the year of 1928-1929.

Following the custom of other years, the Industrial Chemical Club held a series of smokers throughout the year. At the first of these, Mr. C. F. Burke, 2T8, outlined in a most acceptable manner the work carried on at the water filtration station of the City of Toronto.

Early in the term, the Club held its annual trip, which took us to the plant of the Industrial Alcohol Company at Corbyville, just outside of Belleville, and also to the Point Anne plant of the Canada Cement Company. At the first of these plants we saw pass before us a most intoxicating array of bottles containing liquid of that rich colour so much to be desired. However, the word was "mustn't touch"—such is life!

At the Cement plant we came into the most intimate contact with cement, its constituents and manufacture. The return journey was not the least enjoyable part of the day's proceedings.

Soon after, the Fourth Year paid their annual visit to the Wood Distillation plant of the Standard Chemical Company at Longford and were right royally entertained there by the representative of the company.

Mr. Harvey Westren of the Dunlop Tire and Rubber Company was the speaker at the second smoker. A new departure was made, namely, that free apples and cigarettes were distributed at this meeting instead of the usual feed in the Great Hall.

The next smoker brought us Mr. Ross Elliot of the Lowe Bros., who gave an illustrated talk on paints and allied materials. Mr. D. H. Matheson of the Fourth Year also contributed a discussion of "Poison Gases, their Manufacture and Use in Warfare".

The Chemical Club was represented at School Nite by Mr. N. Helper and his able assistants who dispensed liquid poison to the merrymakers, thereby contributing much to the success of the function.

Bill Jones of 2T8 and "Yukon Jake" Kerr, of 2T5, provided the educational and entertainment features respectively at the final smoker. Mr. Kerr has become a favourite with chemicals of all years.

The closing function of a very successful year took the form of a dinner held in Hunt's Tea Rooms about the middle of March. Mr. E. T. Sterne, President of the Ontario Association of Professional Engineers was the chief speaker of the evening. Professors Bain and Ardagh also contributed to our store of knowledge and to the general atmosphere of good will.

At the Annual Elections, Mr. Ralph Ferguson was elected (by acclamation) to the Chairmanship of the Club for next year. Congratulations, Ralph, we know you will lead the Club through a successful year.

And now, may the mercy of the Lord be with us all, and particularly with those of us who fare forth into the great world of industry.

W. Dean Irwin,
Chairman, Chemical Club.

The Architectural Club

Another school year has come and gone, leaving behind it for some, fond memories of a University life now completed, while for others it means but a further stride towards their chosen objective. It is just such a mixture of varied feelings that is to be found among the members of our Club, of whom and for whom we speak.

The first activities of particular interest were the customary fall sketching trips. Perhaps the most notable of several expeditions was the one which took us to Mr. Fred Brigden's home and studio, north on Yonge Street. These trips are held under the direction and guidance of Mr. C. W. Jefferies, well known Canadian artist, and to whom much credit is due for the success of such training. The added advice and criticism of Mr. Brigden was of great value on this occasion. The weatherman has much to do with the success or failure of these trips, and to overcome this to a degree another plan is under consideration for next year.

The opening meeting of the year was held at a downtown hotel and proved to be a marked success. After a sumptuous repast, our new Honorary Chairman, Mr. Allan George, spoke a few words, in which he professed a sincere interest in the welfare of our Club. We certainly appreciate the honour bestowed upon us by his acceptance of the office. After Mr. George's address, the usual initiation stunts and skits were administered to the Freshmen, to the amusement and entertainment of all present, with the possible exception of the frosh.

The next meeting was held in the studio of the Department and was of particular interest. The topic, "Interior Decorating", was one directly connected with our work but one about which we then knew very little. Mr. Howard from Thornton Smith's was the speaker and imparted a great deal of valuable information in a remarkably short time. As is our custom, tea was served at the conclusion of the meeting.

In the second term the first meeting was held for the members of the fourth year. A dinner at Hart House opened the evening's activities, after which Col. R. E. Smythe, of the Technical Service Council, led in a discussion. The prospects for employment and the vital question of choosing the particular branch of Architecture one wished to follow were the themes of the discussion. Through Col. Smythe the Technical Service Council should be of great value to each successive graduating class.

Two other meetings are lined up to conclude the programme, one a discussion under Mr. H. H. Madill and a second at which it is hoped Mr. J. M. Lyle will speak. One of the most interesting trips of the year was a tour of inspection of the Royal York Hotel. From basement to roof we climbed, the inspectors and foremen giving us much practical knowledge on every branch of the building trade. Building operations were at such a stage that construction of all types was quite apparent, and the Club members certainly made the best use of their all-too-short time. The junior years were fortunate enough to make a trip to the new Star Building, which the fourth year was unable to attend. Such trips are invaluable from a structural standpoint and it is to be hoped their numbers will be increased in future years.

Incidents which amuse and entertain never fail to crop up in the drafting room, and this year they were frequent. The boys' style, however, was cramped by the ever-present danger of a feminine face appearing, perhaps framed in Titian locks. The year's work, on the whole, was enjoyable, if such may be said of any school work.

My only hope in closing is that the Club will support the new Executive, under Fred Green, as it has always done in the past and that every success may be theirs in the coming year.

J. H. Collins,
Chairman, Architectural Club.

R.D. SINCLAIR
2ND YEAR REP.
PROF. A. GEORGE
HON. PRESIDENT
J.H.A. COLLINS
PRESIDENT
C.R. WIDEMAN
3RD YEAR REP.
D.I. McCAVGHERTY
1ST YEAR REP.
A.W. DAVISON
VICE PRESIDENT
ARCHITECTVRAL CLVB
EXECVTIVE
FACVLTY OF APPLIED SCIENCE
1928 — 1929
J.F. GREEN
TREASURER
K.O. MELICK
SECRETARY

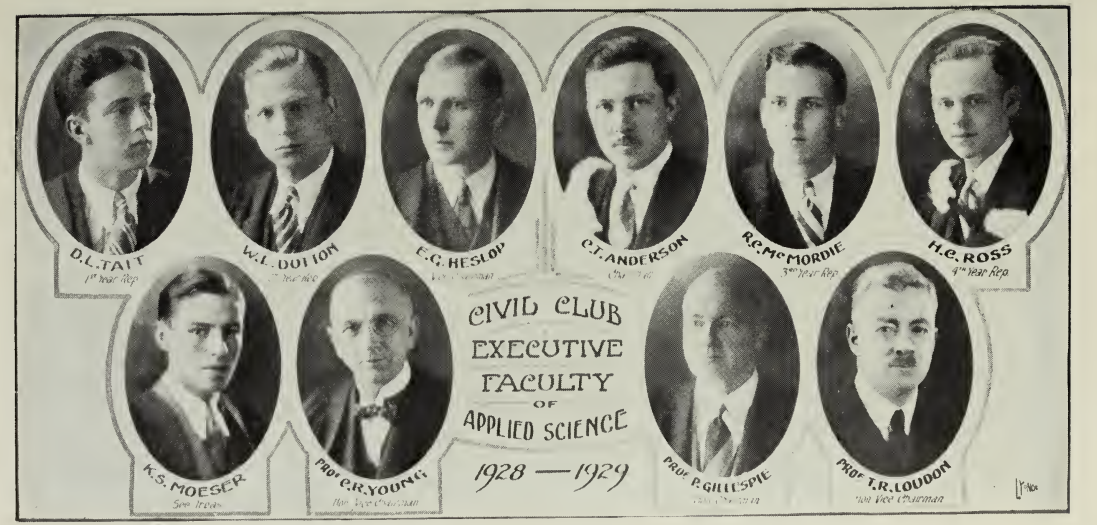
The Civil Club

It is a matter now of tradition, that early in the Fall term the students of this ennobling profession should hie them to some fair metropolis to view the wonders of some engineering work. This year the committee elected to make the journey even more alluring and momentous. Plans were laid and arrangements duly made. The day of the event approached when, all unheralded, proclamation was made that we mark time. For had not the Council passed motions to the effect that all Schoolmen of whatever order should make holiday upon the same day. Ensued much scurrying, and turmoil among the other departments. Finally, order grew out of the chaos and we found ourselves on the rainy morning of October 23 headed for Buffalo, N.Y., accompanied by the majority of our Mining brothers.

The itinerary included a visit and inspection of the plant of the Curtiss Aeroplane and Motor Works at Buffalo, and the Bethlehem Steel Mills at Lackawana. The manufacture, assembling, and testing of the various aeroplane parts proved of great interest to all. We arrived at the rolling mills somewhat late in the afternoon. Then followed a hectic hour of rushing hither and yon, always going somewhere, but never arriving. This tour had plenty of action to say the least, albeit it was too dark and rainy to make it pleasant. Returning to Buffalo, dinner was had at the Statler or elsewhere. The evening was spent in touring the theatres. As usual, the T.T.C. rendered excellent service. We would, however, suggest that precautions be taken to prevent the bus stalling outside the Customs Office: it's such a hindrance to traffic.

On December 12 the usual Smoker was held in the East Common Room at Hart House. There were plenty of smokes for all, and if the glue melted in the pipes that was the fault of no one in particular. Prof. C. R. Young, as guest, spoke briefly. Col. R. E. Smythe, of the Technical Service Council, addressed a few remarks to the gathering concerning the objects and work of the Council. The speaker of the evening was Mr. Gore, who gave a very interesting and educating address on "Waterworks of the Past and Present." The usual lunch in the Great Hall put a finish to the evening.

As a diversion from the heavy (?) grind of Structural Design Lab., the Third and Fourth years decided to prove their mettle at hockey. Manager "Rus" Clarke of the Third year managed, by


D.L. TAIT
1st Year Rep.
W.L. DOLTON
E.G. HESLOP
C.T. ANDERSON
R.C. McMORDIE
3rd Year Rep.
H.C. ROSS
4th Year Rep.
K.S. MOESER
PROF. C.R. YOUNG
Hon. Vice Chairman
CIVIL CLUB
EXECUTIVE
FACULTY
OF
APPLIED SCIENCE
1928 — 1929
PROF. P. GILLESPIE
PROF. T.R. LOUDON
Hon. Vice Chairman

diplomatic negotiations, to have the belligerents face off on the cushion on the afternoon of January 22, and what a scrap that was. If bruised ankles, skinned shins and sore heads are indicative of the fracas, it was a veritable fight to the death. H. Williot Nimmo, received the worst pummelling. Ask him if a punch on the end of the nose improves one's looks. Suffice to say, that the Fourth year very graciously conceded the victory to the Third.

February 26 saw the closing event of the season in a smart sit down, in the Graduates' Dining Room at Hart House. Profs. Treadgold, Loudon and Young were guests. Prof. Young excelled himself in his address, "The Engineer". We regret that due to illness, Prof. P. Gillespie was unable to attend. The boys rallied nobly and altogether the affair was a success.

In concluding, the Club wishes to extend thanks to the Professors of the Department, who have given willingly and unstintedly of their time to further our interests.

We congratulate "Bob" McMordie on his election to the Chairmanship, and wish him every success in the coming year.

The Debating Club

For the benefit of new readers and those School men who protest that they have never heard of the Debating Club; we might say that the club was established to encourage those School men who happened to realize the importance of being able to express themselves clearly and concisely before a group of people. The chairman and officers of the club organize discussions, debates and lectures to afford the members opportunities of expressing their thoughts.

It is very regrettable that the same lack of interest in debating, that has been so apparent among the majority of under-grads should be as equally noticeable this year among the students at S.P.S. It is quite natural that the smaller clubs should enjoy the popularity, or the reverse, of the University and Hart House clubs.

In spite of the lack of great numbers of men at the meetings, a few enthusiastic disciples of Demosthenes have made them most enjoyable. May I here thank Dr. W. L. Grant of U.C.C. for the splendid address that he gave to the club last Fall. The inter-year debates went off with the usual super-abundance of heat and energy. Represented by Messrs. Bryce and Smith, the First Year again triumphed, capturing the Sedgewick shield. Although vanquished by younger and less experienced opponents we wish to congratulate Messrs. Argo, Parker, Watson and Clifton on their splendid efforts. The active year was terminated by the annual Oratorical Contest. After lengthy arguments by the judges, Messrs. Gillam, Argo and McKillop were declared the winners. We congratulate them.

The chairman wishes to express his sincere thanks and appreciation for the interest and active part taken in the club this year by Prof. Allcut, Prof. Zimmer, Prof. Arthur and the various members of the club executive.

D. G. W. McRae,
Chairman.

J.E.R. WOOD
3RD YEAR REP
D.G.W. McRAE
CHAIRMAN
PROF E.A. ALLCUTT
HON CHAIRMAN
G.R. LORD
4TH YEAR REP
A.L. WATSON
2ND YEAR REP
V.P. MARTINOFF
SEC TREAS
DEBATING CLUB
FACULTY
OF
APPLIED SCIENCE
1928 EXECUTIVE 1929
L.C.H. JENKINS
VICE CHAIRMAN
W. BROWN
1ST YEAR REP

Gull Lake

According to schedule, last August 16th, the main body of the Civils advanced on Gull Lake by various means of transportation. The party that came by the combination route (train, hack and boat) were treated to a little comedy entertainment on the last lap by Muench and Hopkin, the vaudeville team. Ed very kindly loaned his baggage complete for the occasion. The act was mainly a baptismal service in the Gull River—everything was recovered and most of it eventually dried out.

The week after, the Miners arrived, finding, as is usual it seems, that the choice bunks were taken, and the rest of the sleeping equipment stored away safely out of the rain. However, things were put to rights without any blows being exchanged. The next day each Miner was given a little hammer and a bag, and all got to work at once dissecting the surrounding country.

The Civils accomplished during working hours many difficult feats of surveying, and also a few outside that time. The Party of Hair Splitters left behind them a record that will stand for some time—perhaps.

A very pleasant two days' field work was spent by each party of Civils at the Falls on Gull River, making a power survey. It is hoped that the foundation was laid then for a lighting plant which will provide illumination for the main street of Minden which has been sadly neglected.

Since the work of the day did not wear out completely our hardy Miners and Civils, many different means were taken to use up the surplus energy. Doubtless from this cause, Nick, the Sheik, walked into Minden and back one night. Every time after that he was called for, and was returned, weary but smiling.

Duck hunting was a sport indulged in by a few, without any serious danger to the ducks. Indeed, one morning, a family of our feathered friends made a special visit to the camp, to encourage the hunters. The ones with the guns fired before giving warning as usual, and gave the ducks quite a scare, but nothing else. In justice, however, it must be admitted that we did see a couple of dead ducks in camp.

One of the most popular sports was throwing John E. into the lake. We enjoyed this diversion, particularly in the early morning hours when the air is pretty chilly. Other people were also ducked at odd times. We remember one morning when nearly everyone got thrown in. The Mechanical Department in particular got a good soaking.

Several good baseball games between the Civils and Miners were played under the personal direction of President O'Toole, wearing his famous hat.

A regatta was held on Labour day, and the events run off in great style, in spite of rainy weather. The champion of the day was a graduate forester, Louis Scheult, who won by a considerable margin. The day was completed with a dance in the bunk house.

Near the end of the term a Big Binge took place—of which, perhaps, the less said the better. But we are sure that none of those present will forget that night for a long time.

The day came too quickly when we had to gather our stuff together and break camp. A final effort to make a clean up at poker was staged by a few of the night watchmen. At 4 a.m. they hauled the rest of us out of our bunks to an early breakfast and a brief farewell to the camp.

1st YEAR
R.B. BRYCE
C.R. LORD
DIRECTOR OF PUBLICATIONS
K. H. RAPSEY
EDITOR
2nd YEAR
W.E. ALGIE
TOIKE · OIKE · STAFF
FACULTY OF APPLIED SCIENCE
1928 — 1929

C.R. ARMSTRONG
G.M. GRAY
J.D. WRIGHT
A.W. DAVISON
4th YEAR
E.A. BLACK
H.T. PRITCHARD
ENGINEERING
SOCIETY
AT
HOME
COMMITTEE
1928 — 1929
G.H. McVEAN
E.R. SHARPE

The School At-Home

"Best party in years," "the snappiest At-Home I ever attended," "the acme of perfection" and so on *ad infinitum* were a few of the flattering comments made about the premier function of the year, by those fortunate enough to be present to take part in the revels. The unanimous consensus of opinion seemed to be that our At-Home, this year, was one long to be remembered in the annals of time.

Lectures and labs were forgotten; cares were cast aside; even the horror of approaching exams was given but slight accommodation in the minds of the undergrads, as three hundred couples tripped the light fantastic to the braying of trumpets, the sobbing of saxophones, the tinkling of pianos and the sighing of violins. The Ballroom was magically transformed into a veritable crater of human activity. Its beauty was enhanced by an artistic scheme of decoration dedicated to the glory of "School".

Supper in the Main and Pickwick dining rooms was attended by much frivolity and a delightful repast. The participants gave vent to their enthusiasm by accompanying the orchestra to the melodious strains of the "Psalm of Life," a resounding "Toike Oike" echoed through the halls and corridors of the main floor and then —back to the Ballroom and more festivities.

At supper, the party was just getting warmed up and, to silence the zealous acclamations of the gay revellers, the party was continued at once. Next morning the School At-Home was but a pleasant memory. School men are sustaining themselves in their labours with the consolation that next year's At-Home is but a twelve-month away.

E.A. BLACK
1st Year Rep.
G.M. GRAY
Chairman
J.D. WRIGHT
President
E.R. SHARPE
2nd Year Rep.
N.D. ADAMS
3rd Year
J.T. DYMENT
Secretary-Treas.
ENGINEERING SOCIETY
DINNER COMMITTEE
1928—1929
G.H. McVEAN
3rd Year
A.W. DAVISON
4th Year Rep.

The School Dinner

For the 39th time Schoolmen and their professors met on common ground or more correctly in a common hall and here again we correct ourselves, for the Great Hall at Hart House is no "common" hall. However, needless to say, they did meet. The occasion was the Annual School Dinner—the traditional annual affair and like every preceding dinner, it had traditions of excellence to live up to. It had to aim at a high mark of achievement. To attest that that tradition was not broken and that it was an achievement, there are the one hundred and fifty that were there.

To further the claim that Schoolmen are not only big silent do-ers but that eloquence does burst forth on occasion, several undergraduates composed part of the toast list.

Jack Wright, the Society's President, acted as Master of Ceremonies, and very ably did he do so. Following the toast to the King, Doug McRae did, in literary parlance, very ably propose the toast to the University, which was replied to by Sir Robert Falconer. We always maintain that Sir Robert's rhetoric and personality add charm to any dinner and this was no exception. Nate Adams had some kind words for the faculty and our genial Dean replied "fittingly"—as they say in the press—and those who were there will remember his illustrative experiment worked perfectly. That grand old profession was then flaunted by Harry Pritchard and the reply came from one who should know; one who is prominent in the Engineering world and a past president of the Society, Mr. W. A. Osborne. "Gummy", surnamed Rochester, had some flattering remarks for our sister societies and the representatives from McGill, Queen's, R.M.C. and O.A.C., came right back and said their respective "pieces" most interestingly.

The inimitable Prof. Loudon, after he had unburdened his chest of a couple of good stories, made presentations to each member of the successful School Rowing Crew, which demonstrated its ability earlier in the season.

Then came the grand climax. We were fortunate indeed in being able to get The Hon. Mr. Justice W. R. Riddell, K.C., B.Sc., L.L.D., D.C.L. to speak to us. After hearing it all, I think speech is not descriptive enough. His was an address of the first water. One could expound at length the merits of that address but why should we? Those that were there heard it and those that weren't—well, they missed something. And incidentally His Lordship is the oldest living engineering graduate in Canada.

It was a fine dinner. Again I say, ask any man who was there. No small item of credit is due to those men behind the guns.

ENGINEERING SOCIETY
EXECUTIVE
UNIVERSITY OF TORONTO
1928 — 1929
G.R. LORD
J.M. GOSS
J.R. WHITE
G.D. PARKER
PRESIDENT S.C.A.

The Graduating Year

Four years have passed and now we find ourselves on the verge of the great adventure—life after graduation. To say that the time has flown is quite unnecessary. And still the wonder grows. Where has the time gone and what have we acquired? The answer to the latter question rests with the future.

Modesty forbids that we should claim especial success as ours for our endeavours here. But I think we can truly say that there have been things done by the year individually and as a whole that will stand out in time to come. May 2T9 live on through her accomplishments.

I do not propose to make this a formal valedictory in any sense. We are going to get Torontonensis and there we may read at pleasure just what we are, what we've done and how we've done it these four years.

In our approaching the final year at college many of us have followed the natural trend and with determination to make the most of our time have found out just what was going on around the university that might be of interest to us. Whether or not we have gained our end remains for each to say. This year has been full of activity and interesting things. Let us hope not so much so that our "trials and tribulations" in April found us wanting.

Let us trace briefly the program of the year. And here again I do not choose to dwell on everything. This is not Hansard.

Most graduating years claim distinction for their athletic prowess. Has ours been less than theirs? I think not. We have men among us who are prominent in university athletics.— We have those who have upheld the honour of School on the field, in the gym, in the tank, etc., and we have that great body of stand-bys who have also "played the game".

I do not propose to delve into personalities here because in this limited article neither any nor all may be done justice. We all know these men—title-holders in swimming, track, fencing, gym work and those who have contributed to the competitive sports,—rugby, hockey, water-polo, rowing, etc. In fact we could write at great length about all this, but turn over the pages and read it first hand.

Slipping from that phase of life to another we ask ourselves, "How do we 'record' on the Social Register'?" If this last named organ or instrument has to do with social activities—well—we had quite a good year party before Christmas and a graduation dance —what do they say?—par excellence? Either one of these was proof enough that we can upon occasion, lay away our theses and lab reports and don the "merry mask". In fact I do not hesitate to say "a good time was had by all present".

We must not forget to mention a first-rate graduation dinner and also another one tendered us by the Alumni Association. Incidentally they are a great crowd. It can easily be seen where they got their early training.

Further, I doubt not that the School At-Home owed its unprecedented success in a high degree to 2T9. And there was a real representation at the School Dinner this year. As a matter of fact I think we were pretty well mixed up in everything.

As for things in general, around the faculty 2T9 was on top. Jack Wright acquitted himself nobly at the helm of the Engineering Society. The society has grown and improved under his leadership and now stands in an enviable position among similar organizations. Gerry Gray's work marked him as a real "social director". Do you remember that previously mentioned At-Home? Gerry also "ran" the elections, et al.

The club chairmen—all 2T9, naturally, have carried on efficiently and successfully. The clubs are mighty active and play a big part in School affairs.

Of course, we must draw to your attention the able leadership that the Athletic Association has had. Johnny Goss has been on deck all through the year. There is no doubt he earned that bronze "S" that the boys voted him.

Who can say that we haven't had publicity around School this year? More credit is due to its director—Ross Lord.

As a matter of fact, I could tell about a lot of things the members of 2T9 have done, but I've probably exceeded the limit already.

Now we come to the important thing—the original "raison d'être" for our coming here. We have passed through the hands of a fine faculty,—men who have given us not only the best of instruction but much else that will help us through life. May our futures return to them the reward greater than money.

I fear this article has wandered a bit and may be disjointed in spots, but after all it is simply the product of the writer's thoughts in retrospect.

May I have just a word to 2T9 itself. We have been united here for four years. May we carry on, so that 2T9 may not simply be known as a "year" at School, but as a group of men banded together through life.

In closing, I extend my thanks to the executive and to every man of the year for his past co-operation.

May success in the fullest sense be the lot of every one of you.

A. W. DAVISON, *President.*

Graduation Dance

In accordance with an ancient and honourable custom the venerable fathers of 2T9 gathered together in one place to determine the time, the place and the price for that occasion of occasions—"The Last Ball". So out of all this turmoil it was decided to capitalize the enthusiasm at election time and to stage the final struggle the night before School Elections.

Smiling Gerry Gray with his inimitable manner was delegated to nominate and invite the patronesses, and his patronizing flowers contributed in no small way to the harmony of the party.

Everyone of the local sages dusted off the moth eaten evening blacks. Some were fortunate enough to draw a positive answer from the "most wonderful girl in the world," others dragged forth the Ouija board and forced it to spell the name of some other man's girl.

On Thursday evening, March 7th, the first signs of spring appeared. The local love-birds mated and migrated in canary taxis to the King Edward Hotel. Here the problem arose as to the location of the Alexandra Ball Room, and it was learned that the Pompeian Room had been fitted with two new wall brackets and had been married to a new name.

Art Davison had arranged everything at the Hotel so perfectly that the whole party ran with the smoothness of great mechanical efficiency—perhaps the oil used helped considerably.

Supper was served to those who wished to eat in the Pickwick Room, where Doug McCarthy had arranged the table decoration with aeroplanes to honour the new department that found its origin during our college life. Professor Parkin enjoyed playing with the toy aeroplanes rather more than eating supper.

At 2.00 A.M. the party was going at peak efficiency so that in order to stage a well rounded affair it had to continue till after 3.00 A.M. The orchestra with well-lubricated whistles blew a very merry programme, while the lads capered eagerly around and around. Finally they played "It's Three o'clock in the Morning" and the boys, understanding their meaning, rushed out of the Hotel to some unknown localities where they joined early breakfast parties, etc., etc., etc.

And so the first evening of perhaps the greatest week-end at the old School passed on into the second great day—election day. Everyone finally found their way home tired, broke, but happy, and forthwith the lord chamberlain closed the social calendar for the season.

H. T. Pritchard,
Chairman.

School Night

Schoolmen and Grads called for their "Partners-in-Crime" on Tuesday evening, January 29th and took them to the seventh annual Stunt Nite at Hart House. Only with the assistance of the local police was it possible to limit their numbers to fifteen hundred.

Ken Joyner and his merry assassins after convicting the Varsity staff of many unmentionable crimes, hung the editor from a newly erected scaffold and then printed and distributed the first edition of "Red Ryan's Rag".

Bill Dowds extended the electricals in a marathon swim and even made the water ripple with laughter.

Rus. Armstrong bribed his mechanicals to enact a train scene depicting a honeymoon, which did justice to the great dramatic possibilities.

Reg. Saunders and the rest of the miners uncorked their bottle of wit and fun in the East Common Room, and greatly added to the pep of the evening.

Johnny Goss and his mermen played in the fountain while romantic couples graced the benches round.

The chemicals sold the proverbial "sandwich and a beer" at Dean Irwin's East End Inn and did a rushing business all evening.

Monsieur le captaine Rooke was master of ceremonies in the Great Hall, and endeavoured to relieve the pangs of hunger that grew with the hours.

Three orchestras upset the stillness of the atmosphere in the Big Gym, East Common Room and Great Hall and the crowd drove their dogs around till they barked.

At one o'clock the hunt was over and the foxhound and everyone went home tired but happy.

H. T. PRITCHARD,
Chairman.

3T0

September found 3T0 once more assembled in "good old School" gazing loftily down upon the pugnacious sophs and the lowly subjects known as "Frosh" mixed up in the usual free-for-all outside the Supply Office.

After the business of registration, payment of fees, and so on, was disposed of, these haughty juniors set about to re-establish themselves in School life again after the long(?) vacation, and right nobly did they do it.

First was the rugby field—where our old friend Lloyd Hallam was wont to boot the oval for the first squad. Lloyd has been bordering on stardom for the past two years, and with Bill Darling for a running mate he certainly "arrived".

Next there was the track, here again 3T0 came to the fore when George Mason ran the hurdles to grab off a place on the first team. At the same time as our rugby and track stars were strutting their stuff, many of our dignified numbers were frequently to be seen out on the front campus kicking each others' shins and bare knees. These hardy men were soccer players, led by that old master at the game, Jim Dowling, the main cog in the School machine, which went through the finals only to be nosed out by Knox, after two close games.

Thus we see that 3T0 possesses more than her share of the athletes wearing the blue, white, and gold. But all interest was not centred in athletics. In the second week of November 3T0 held its year party—the boys turned out almost 100% and a real party it was.

During the long winter months came the struggles and toils with Structural Design and Electrochemistry—drawings in on time—Thermo. Lab. by 2 P.M. sharp—figuring that hydraulic grade line and so on, until when March came around all our thoughts lightly turned to another year party. Held at the Argonaut Rowing Club with the Varsity Entertainers providing the harmonies, the boys made whoopee no end—aided, of course, by "a pulchritude of feminine association" (by permission of the *Varsity*).

After the party, which was the closing social event of the year everyone humped their backs and rounded their shoulders to the task of learning just why, during isothermal expansion, T*a* should equal T*b*. Having solved, we hope, these problems the boys wore upon their faces an expression of extreme learning and wisdom, but the wearing qualities of the expressions were doubtful.

Elections were held but without the usual fags, peanuts and other accessories which were ever present in the days of yore. However, strange as it may seem, votes were won without much recourse to such bribery.

After the smoke of the election battle rolled away, the old executive was no more, but was replaced by another. Russ Armstrong

was the President elect and to Russ and his executive we turn over the reins of office, wishing them every success next year and looking forward to a prosperous year—and graduation.

Before closing, on behalf of the executive I wish to forward to the year our most sincere appreciation of the manner in which you have supported us, and hope you will give "Army" the same support next year.

R. M. Ferguson,
President.

The Junior School At-Home

This annual function occurred on the 16th of January in the Alexandra Room, King Edward Hotel, with customary enthusiasm and support from the whole faculty. In spite of the late opening of the term and an epidemic of "Flu" a surprisingly large crowd turned out and, we hope, enjoyed the party to the full.

The music was exceptionally fine, with Jack Slater's "Canadian Aces" doing the honours. Those boys certainly made music that night and no mistake. Judging by the rare quality of the fair sex it would seem that the Juniors of Good Old School are right there. —Congratulations men!

We wish to take this opportunity of expressing our appreciation to the patronesses, Mrs. C. H. Mitchell, Mrs. T. R. Loudon, Mrs. P. Gillespie, Mrs. W. J. T. Wright, Mrs. L. J. Rogers, Mrs. H. W. Price, Mrs. K. B. Jackson, and Mrs. J. J. Spence, who so kindly consented to act for us in this capacity. And also to the committee who expended their time and energy in endeavouring to make this occasion live up to the high standards set by its predecessors.

3T1

It gives us a great feeling of satisfaction that we have nearly finished our second year at college which means, also, that half our college days are gone. May the remaining years be as happy as the past two. We only hope that our expectations of "School" life have lost nothing by the realization that our efforts have been rewarded, and that we have obtained more from the friendships and acquaintances formed at "School" than could have been found elsewhere.

Last fall, about the 28th of September some two hundred odd Frosh were observed rushing around in the Mining building, in the usual state of bewilderment, all trying to register at once. For the next two or three weeks the Sophs found it necessary to amuse themselves according to custom at the very obvious expense of the Frosh. A few free-for-alls were indulged in by the members of the two years collectively, during which periods of strife the Frosh were very obviously subjected to a very general clean-up of more than hygienic value.

One red letter night in October, these same Frosh were summoned to a reception in examination hall, where they were most thoroughly examined under the watchful eye of Bert Tyson.

The initiation over, the Frosh busied themselves with plans for a whopper Soph-Frosh banquet. This annual event staged by the freshmen for the benefit of their betters happened on a Friday night early in December. Congrats, Frosh, for a bang-up dinner. The speeches were delightfully brief and hence enjoyed by all. Dean Mitchell illustrated the inevitable development of "Schoolmen" from the time of their inauguration as Frosh through the stages of Sophomore, Junior, and Senior until they are ready to graduate. Prof. Loudon as usual said a few words to the boys and was accorded all the attention which is ever given to a popular professor. Charlie Morrison entertained the gathering with a rare display of wit at the expense of the staff, which he joined shortly over a year ago. The Carls-Rite Hotel was victimized in the usual manner by the designing members of all years present.

The "spirit of David" having somewhat subsided, the more romantic lights of the year began voicing the request for a year party. No sooner said than done. On the evening of November 2nd Parkdale Canoe Club was honored with a party served up in the real 3T1 style.

January 16th rolled around and with it the "Junior School At-Home". In spite of the late opening of the term and an epidemic of influenza this event was another success. The foregoing functions resulted in such a burst of enthusiasm that we threw another bigger and better "Spring Dance" at the Parkdale Canoe Club on March 6th. The novelties and decorations, under the gentle graces of Reg Saunders, were second only to the fairness of the many damsels

sported by the men of 3T1. Our only regret is that the quantity of punch seemed inadequate to supply the demand.

"School" and the University athletics are more than generously supplied with men from 3T1. We regret lack of space which confines us to mention only a few. In rugby, Jack White, "Early" Davy and "Dinty" Traynor have managed to hold down regular positions on the Intercollegiate team while "Tuffy" Burk with the "Orphans" and Bill Campbell and John Bailey with the intermediates merit much praise. Our very capable Vice-President, Bert Tyson, won the Intercollegiate light heavy weight wrestling championship. Wilf Newman enjoyed another successful year as centre on the first Basketball team, intercollegiate champions. Duff Thompson is stepping as lively as usual on the "track" and it is going to take a good man to beat him next year.

Karl Moeser, Panay Ballachey and Ned Ward managed, respectively, the Junior School hockey, basketball and baseball teams. Little wonder that School wins athletic championships with monotonous regularity.

We feel this to be a good time to express our real appreciation for as fine an executive as any president could wish for. Bert Tyson as vice-president, Frank Dyer as treasurer and Bev Puddy as secretary certainly did themselves proud.

Spring election results are just out. We pass the baton to Jack White and wish him every success. He is also fortunate in being favored with an able executive in the persons of John Franklin vice-president, Reg Saunders treasurer, and Karl Moeser secretary.

Success to all in the coming exams.

D. H. Traynor,
President, 3T1.

3T2

When we think back on that glorious September day on which the two hundred odd Freshmen enrolled at the Faculty, we realize how green we were. We were shortly to be outdone by our neckwear but many of us did not know that and in our innocence we were happy.

We soon found that we must remove our hats in the buildings and that spats and bowlers were taboo. We were ordered to come in and leave by the "back door" and on pain of being drawn, quartered, hanged, and what have you not to *dare* to enter the eastern portal. We promptly looked it up and walked in and out a number of times, nothing interesting happened so we concluded it to be a fake and gave it up in disgust. It was subsequently established as the recognized route between the Dynamics and Electricity lectures. We were told confidentially that no sophomore worthy of the name arrived at the school before noon with the exception of Saturdays so possibly that accounted for our freedom.

The initiation of the first year was a huge success but the close secrecy in which it was shrouded during the preceding week or two caused not a little trepidation among the more timorous. It turned out to be a very well-organized affair and consisted of barrels, blindfolds, and waterbaths. A move in time saved nine sore spots. All finally having passed through the mill the Freshmen were told they could hold up their heads in pride as acknowledged Schoolmen.

The evening was fittingly terminated by a general adjournment to Hart House where we were regaled and revived with food and music in the order named. "Workie" as usual, did his stuff to perfection.

In return, the Frosh tendered the customary banquet to the Sophs at the Hotel Carls-Rite. The dean, as the main speaker of the evening, gave a very interesting and instructive address and we were favoured in having with us a number of the faculty, several of which spoke to us for a few minutes. The banquet terminated at nine o'clock and the majority of those present proceeded thence en masse to a show.

Two social functions were held in which the Frosh had a hand, namely, the Junior Prom. at the King Edward and the year party, which was held at Parkdale Canoe Club. Both exceeded our expectations.

If one may judge by appearances, 3T2 has secured a good start toward a highly successful career along all lines of activity. In athletics such men as Dickson, Britnell, Murray, and others too numerous to mention, have shown themselves to good advantage.

I hope, and feel sure, that next year will hold for us even greater promise than this.

W. H. Bowes,
President.

Toike Oike

Though Toike Oike cannot boast of employing editorial recalcitrance and subsequent spectacular "martyrdom", as a means of bolstering public interest, we feel that the various issues published during this last year were up to the standard set by our predecessors.

The present staff had no Centenary Number with which to cope, but a School At-Home Edition was hurriedly thrown together at the instigation of the publicity committee for that event.

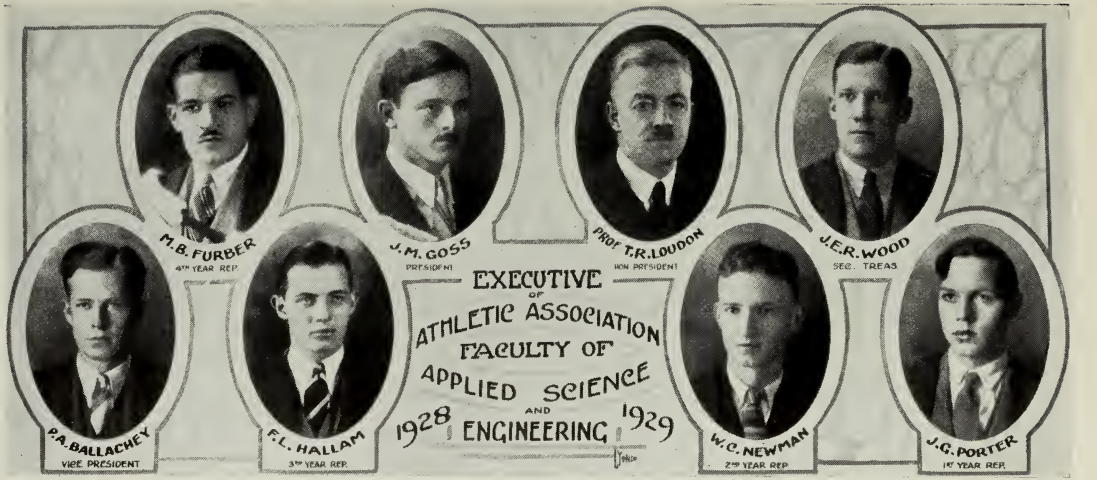
The advice to freshmen was printed under the paternal care of Rochereau de la Sabliére, and contained the usual words of wisdom which, if taken three times a day after meals, are guaranteed to make the freshman's lot a bed of roses, minus the expected thorns.

Elections Number was fostered by Bill Algie, and, as always, threw a severe strain on the block type department at the University Press. This paper probably has more black than white in its composition, and follows religiously the axiom to "make your ads noticeable"—et comment!

Other issues in the honourable mention column were brought out for Christmas and School Night (or Nite, if you prefer).

At any rate, we hope you all appreciated the few little blurbs. If placed all together, they might make one paper of respectable size.

Keith Rapsey,
Editor.


M.B. FURBER
4TH YEAR REP.
J.M. GOSS
PRESIDENT
PROF. T.R. LOUDON
HON. PRESIDENT
J.E.R. WOOD
SEC. TREAS.
P.A. BALLACHEY
VICE PRESIDENT
F.L. HALLAM
3RD YEAR REP.
EXECUTIVE
OF
ATHLETIC ASSOCIATION
FACULTY OF
APPLIED SCIENCE
AND
1928 ENGINEERING 1929
W.C. NEWMAN
2ND YEAR REP.
J.G. PORTER
1ST YEAR REP.

School Athletics, 1928-29

The School Athletic Association

It is with the deepest feeling of appreciation that I would extend, on behalf of the Athletic Association Executive, my heartiest congratulations to those men who have this year held aloft the Jousting Standard of the Faculty in Victory, or gone down smiling, uncomplaining, in defeat—and to those who, willing and unhesitating, contributed their valuable time in the capacity of team managers.

Surely School feels justly proud of her remarkable showing in sport this year for it has been, without exception, the most successful Athletic season in the annals of the Engineering Faculty.

It is significant that no less than eight Interfaculty Championships have been tallied by the stellar work of our supporters and their activities are reviewed, individually, elsewhere.

The operation of the Executive has been, in the main, similar to that of previous years with this notable exception, that a very decided step was taken to introduce a greater efficiency into the method of controlling its affairs.

It is the desire of the Association to build up a sufficient equipment reserve, so that in future years the monies which, at present, are expended in issuing to a team such as it may require, particularly in rugby, will be appropriated for the purpose of purchasing trophies, etc., for Championship teams.

Heretofore the greater proportion of men who have received equipment have been very lax in returning it, a factor which plays an important part in the successful management of the various departments within the jurisprudence of the Association.

Gentlemen, I appeal to you for your earnest co-operation in this respect.

Be it remembered, that the ultimate success of your Association depends upon yourselves, its members, and that the task of more satisfactory managing its finances will be greatly assisted by your conscientious consideration of this problem of equipment.

Next year the Executive will function under the direction of Jerry Wood, who merits your whole-hearted support.

In closing the doors upon the year's work, let us hope that continued success will attend the sincere efforts of those men, who have trained faithfully to bring glory in outstanding achievement to their Alma Mater—their Faculty—and themselves.

John M. Goss,
President.

Financial Statement of the S.P.S. Athletic Association

(To date March 19/29.)

Assets:		
Balance 1927-'28		$ 243.29
Interest October 3/28		3.64
Ellis Bros.		25.80
Collections		7.00
Fees		1,199.00
		$1,478.73
Expenditures:		
B. W. & F.		$ 2.00
Baseball		72.25
Basketball		30.50
Hockey		150.00
Hospital		15.50
Press		4.37
Rugby		507.30
Rowing		31.00
Torontonensis and Transactions		68.80
Swimming and Water Polo		2 .28
Soccer		43.99
Track		25.45
Miscellaneous:		
Cash Box	$ 3.25	
Ledger	2.60	
Locker	119. 8	
Photography dept.	4.70	
Lyonde	22.00	
Stamps & Signs	16.00	
		1,147.77
Cash on Hand:		
Bank		323.66
Petty Cash		7.30
		$1,478.73

School "T" Holders

Back Row—M. B. Furber (*Rugby*). J. T. Dyment (*Fencing*). E. R. Davey (*Rugby*), R. B. Rochester (*Rowing*), F. L. Hallam (*Rugby*), J. A. Williamson (*Captain of Gymnastics*), J. M. Keith (*Captain of Rowing*).

Front Row—J. R. White (*Rugby*), J. E. R. Wood. (*Rugby*). J. L. Davenport (*Captain of Track*), J. M. Goss (*Captain of Swimming*), H. W. Nimmo (*Swimming*), D. H. Traynor (*Rugby*).

School in Intercollegiate Sport

Our representation to the body of Colour Holders has always been noteworthy in proportion to our registration. Of 14 "T" Holders there are no less than 4 Senior Captains, Rowing, Track, Gymnasium and Swimming.

In the matter of Sr. Rugby, the names of Denny Traynor, Earl Davey, Jack White, and Lloyd Hallam are outstanding, while Jerry Wood and Mike Furber contributed greatly to the success of the "Orfuns".

Jack Davenport vaulted his old style again this year and earned for himself the title of Captain of Track.

Jack Dyment has been a consistent winner in the Blue Fencing squad—nor do his achievements by any means stop there, for the Annual Dominion Championships always find Jack well up. He annexed the Duelling sword title in his 2nd year.

Rowing was ably supported by Jack Keith as President and Captain of the Rowing Club.

Jack Williamson not only copped the individual effort at the Intercollegiate Gym contest this year but he has earned considerable reputation outside scholastic circles.

Lorry Bullen, Varsity's crack Polo goalie, won the right to wear the coveted crest by his splendid work in the nets this year.

Murray made the Senior Hockey team in his freshman year. It's a treat to see him in action.

Basketball brings Wilf Newman to mind—Varsity's star centre forward.

In Boxing and Wrestling School was also well represented at the Annual Assault at Queen's.

Next year will again bring to light possibly a score of names of those men who will have brought further glory to the Alma Mater, the Faculty and themselves by their team work and individual exploits—we wish them every success.

JOHN M. GOSS, President S.P.S. Athletic Association.

Senior School Rugby

The prospects for senior rugby looked rather poor at the beginning of last season. At the first scheduled practice, eight men turned up, most of them with little experience but lots of enthusiasm. Barely more than twelve were out at the opening game, and signals were repeated more as a matter of form than in any hope that the players would understand them. However, we won, and won handily, and right now we want to thank those few faithful ones who carried us through the initial stages of the league.

After this first game, several more players of outstanding ability were induced to do the hero act for "dear old School", and on one or two occasions we actually had a full team present at practices. It was at this time, also, that we managed to secure the capable services of Alf Hancock as coach, and the team began to acquire a hazy idea of what it was all about. "Red" Kearns was elected captain, and proved to be a wise choice.

Sr. Meds and Dents were the others in the group with School. By virtue of two wins and two tie games, one of them most blatantly lucky (we admit it), Senior School entered the play-offs. The team which fell before us in the semi-finals was Trinity, a squad with no particularly brilliant stars, but one which had been exceptionally well drilled by George Awrey.

Saint Mikes also reached the finals. The game with them was of the "heart-failure" variety, and produced many a sore tonsil, but School finally won out, both on the playing field and in the committee room afterward, so that once again the Mulock Cup was presented to the boys from the little red School-house.

KEITH RAPSEY,
Manager.

Senior School Hockey

Senior School hockey team didn't finish on top this year as they expected to, but they gave everybody as great battle.

School lost several games by one goal margins when a little luck would have won the game. However, School defeated both U.C. and Meds in hard fought games. Dents defeated School in both games played by two goal margins.

With a little extra punch around the nets School would have won all their games!

The following men played on the team:—Irwin, Higgins, Haggart, Reid, Grosvenor, Sniffen, Switzer, Crerar, and Allan.

M. F. ALLAN,
Manager.

Junior School Rugby

Jr. School did not win the Mulock Cup this year. Worse than that, they did not even win their group. Heaven alone knows how many years it is since such a catastrophe has occurred. As it happens the terrible situation was greatly relieved, when Sr. School turned in a string of fine performances and captured the Cup. They had to, that was all, because School *always* wins the Mulock Cup every second year.

Now it was not for lack of material, nor enthusiasm that the Juniors came out losers. Rather it was because the good material did not show up early enough. Davidson, Joyner, Moeser, Algie, Puddy and Kirkland formed the basis of the squad, which was filled out with freshmen. "Jumbo" Davidson was elected Captain, and the battle was on. The first game went by the board 11-12, Arts hanging on to a slim lead during the 4th quarter, which was all School's. This made it imperative to take the remaining games to win the group, and practice was doubled. Jr. Meds made the situation practically hopeless when they gave School their second straight defeat 6-3. School had led throughout the game, which was played in a sea of mud, but Jr. Meds picked up a fumble for a touch-down in the last 3 minutes.

The bright spot in the campaign occurred in the 3rd game, when after spotting Jr. Arts a touch-down in the first few minutes, School ran up a total of 14 points. In this game Hewett, a freshman, gave a remarkable display of kicking and running, McCallum aiding him very ably. By winning their remaining game against Jr. Meds our boys could have tied the group, and hopes were running high before the game, the manager even betting his wad. The game turned out to be a pitiful affair, a sort of "I-can-fumble-it-oftener-than-you" spirit sweeping School down to a 6-1 defeat. However, the morale of the team was on the whole excellent and a friendly feeling prevailed throughout between management and players. It is sincerely hoped that the experience gained will benefit the players, both School teams and in higher ranks. The coaching duties were ably carried out by George Gray.

The following was the club roster:

Davidson (Captain)	Jones
Gray (Coach)	Strachan
Woodside (Manager)	Watkins
Joyner	Wheaton
Anderson	Puddy
Hetsler	McCallum
Moeser	Graham
Tyson	Adams
Butterill	Sheare
Kirkland	Williamson
Fotheringham	Algie
Hewett	Chalmers
Baker	Smith
Rishor	Clute

Junior School Hockey

Choosing men to represent Junior S.P.S. in hockey this year was very difficult indeed owing to the extreme lateness in starting the term and the exceptionally large turnout. The freshmen, on their enthusiastic support, are to be heartily commended.

We were grouped with our old rivals U.C. and Meds and played the customary two games with each, and it may be said here that during the 1929 season School did not experience a single defeat. The fact that all the games resulted in ties, two at 0-0 and two at 1-1, was to say the least, a lamentable state of affairs but nevertheless we were unbeaten; and in at least two of these games, School deserved a win, having much the better of the play.

Lorne Price, in goal, was regarded as the best of the Interfaculty goal-keepers in the 1929 series and played a stellar game throughout the season. He was ably protected by a defense made up of Walkom, McKenzie and Don McCallum. The front line was composed of Crocker (Captain), Jones, Anderson, Martin and Porter, all played clever hockey.

We predict a great success for next year's team as all the members were freshmen this year and with a year's experience should go a long way.

Association Football

The team has been getting a little closer to the interfaculty cup each year. This year, 1928-29, after defeating Meds in the semi-finals and holding Knox to a one goal lead in the first game of the finals, we were treated to the wrong end of a 4-1 score in the final game.

While it is most unlikely that we would have won, yet the score would certainly have been much less had not Nate Helper, our goal keeper, been hurt in the final game. Shortly after the second period opened, Nate took a flying tackle for the ball just as a fast opposing forward was about to drill it into the goal—Nate got the ball and also the kick intended for the same. With one man short on the field, the Knox boys, with no difficulty, slipped three more shots past MacKay who essayed to keep goal in place of Helper. Though luck went against them the school team kept the game moving fast right to the end. In fact, Downing, the centre forward, got real peeved and juggled the ball through the Knox backfield to score the only School goal of the game—just to show them what could be done under adverse circumstances.

A word about the players:—

Downing at centre, Helper in goal and Ward at outside right, all intercollegiate men, were the best for School. Ward worked hard and beat the Knox defense several times only to just miss the cross bar on fast shots from the right wing.

Franklin and Haggart, the outside half backs, kept the opposing outside wings well checked and assisted their forwards on the attack.

Edmunds and Gregg, two men new to the team this year, used good judgment in checking and formed a strong defense.

Now, as they always say, next year we hope to tell a different tale, and we should. Neglecting the unknown quantity—examination results, the same team will be back and supplemented by players from the frosh to be, we should have a team capable of getting next the silverware.

Personnel of team:

Goal—Helper
Backs—Edmunds; Gregg
Half-backs—Haggart; MacKay; Franklin
Forwards—Ward; McDonald; Downing; McCracken; Riddell
Sub—Wallberg.

W. A. MacKay,
Manager.

School Track Team

Back Row—E. F. Barratt, C. N. Knight, J. L. Donaldson, R. W. Emery, F. V. C. Hewett, E. A. Black, H. W. Nimmo, M. Smith, E. B. Hymmen.

Front Row—A. J. Howe, C. W. Woodside, E. A. Peaker, C. A. Morrison, (*Manager and Coach*), J. L. Davenport (*President of Track Club*), Prof. E. A. Allcut (*Honorary President of Track Club*), W. D. Thompson, R. A. Adams.

Absent—Sprague.

Track

The name of School has been linked with Track Championships for many, many years. This year was no exception, and the insignia of S.P.S. will be carved on both the Outdoor and Indoor Championship Trophies. The winning of the Outdoor meet last October, provided a striking contrast to the performance just twelve months previous. In 1927, Long Jim McKenzie, Varsity Track Captain, carried School to victory, literally single handed, himself winning 23 points in the afternoon and outscoring the nearest competitor, Meds. Last year, 1928, the story was the opposite. The winning points were amassed by a rather large team, mostly freshmen, each contributing his little bit. Those gaining renown on that occasion were Ernie Barratt, survivor of the long drawn-out high jumping contest; Ed. Peaker with javelin and shot; Eddie Hymmen, broad-jumper; George Mason, strong competitor in the hurdles; Jack Davenport, perennial winner of the pole vault; Panay Ballachey, discus and shot-put adept; Howe, Hewett and the Lee brothers.

Perhaps the Soph-Frosh meet had somewhat to do with the keen interest and large turn-out of new-comers. Certainly it is a good event, although a satisfactory method of insuring a large attendance has not been worked out the past two years. In its first year, 1926, there were 98 contestants in the Soph-Frosh Track Meet. It is to be expected that there will be a repetition of this record next fall, and possibly the Sophomore class will win, for a change.

The Indoor Meet provided the second success for the Engineers' team. Strangely enough the win was directly attributable to two men, whose names will be sought for in vain in the list above. They are Ralph Adams, capable sprinter, and member of the 1928 Canadian Olympic team, who won the 50, 100 and 220 yard sprints, also adding a second in the standing broad-jump, and Duff Thompson, who is certainly a redoubtable man indoors, and who won the quarter mile in splendid time and tied Adam's time of 11 seconds in a re-run for second place in the 100. These men also formed the backbone of the two relay teams, helping to set a new record in the half-mile relay. Other winners were Ed. Peaker, in the shot-put, and Woody Woodside in the mile-walk. Harold Nimmo proved himself a valuable reserve in taking second in the 2 mile run and mile walk and third in the mile. Eddie Hymmen came out second in the high jump, Ernie Barratt dropping to third. Knight supplied a point in the 2 mile, sticking it out ahead of a big field for third place. Second in the Pole vault went to Sprague. Emery came second in the Standing High.

The coaching honors go to Charlie Morrison, himself a 26 point man in the 1926 Indoor Meet. Most of the odds and ends of managing were done by Woody Woodside. Our President this year was Jack Davenport. Jack is Varsity Track Captain and Canadian Pole Vault Champion 1928, and an ever-ready worker. Professor

Senior School Water Polo Team

Back Row—Irwin, Grant Little, Murby. *Front Row*—Bullen Moore, Goss (*Captain*), McCarthy, Thwaites.
Absent—Nimmo.

Allcut kindly acted again as Honorary President, and in the course of events was required this season to appear in two track pictures instead of the customary one.

The following is the list of the track athletes to whom School's successes are attributable:

Davenport (Captain)	Thompson
Adams	Sprague
Hymmen	Emery
Barratt	McKay
Peaker	Smith
Howe	Emerson
Mason	Hewett
Ballachey	G. Lee
Nimmo	F. Lee
Knight	Woodside

A record was made in the half mile relay. The team was composed of Adams, Thompson, Hymmen and Howe.

Moral for 1928-1929—"Team work did it".

The fine turn-out on the last day of the Indoor Meet was solely responsible for turning a one-point deficit into a 14 point victory over U.C.

B. W. & F. Club

Forsooth, say I, the world is indeed becoming truly civilized. In no other way can we explain the apparent reluctance of Schoolmen to turn out for the amusing pastime of breaking noses, raising cauliflower ears, twisting one another's toes, seeing how many knots they can tie each other in, or slashing their pink-tinted flesh with the iron rods known as fencing foils.

Schoolmen are indeed leaning towards a tendency to be refined. Each year it becomes more difficult to inveigle them to exhibit their powers in the fields of boxing, wrestling and fencing. Hence we have but more praise for those who have turned out and made the fine showing which they have.

Among these may we mention "Bert" Tyson, hitherto unheard of and only just beginning to realize his strength. 'Twould seem that Bert won both the wrestling and boxing in the heavyweight class of the inter-year assault. At the senior, one of the boys from Guelph managed to nose him out in the wrestling, this, however, did not prevent his taking part in the Intercollegiate Assault.

Next but not less comes our old friend Jack Dyment. May we be allowed to congratulate you, Jack. For still another year Jack has tucked away the Intercollegiate fencing championship. Not being daunted, he stepped still higher this year to show a few of the old masters that youth is not to be put lightly aside. Jack is now the worthy holder of the Dominion Fencing Championship.

Having brought our two brightest stars from behind the clouds we must not forget the embryo, of this year. Rudd is a lad of fair promise and but needs a little experience to be walking into the head lines. Mooney, another name famous among jockeys, will be treading the spotlight of the boxing world does he but choose to follow this line of sport.

Hence with these words do we close, hoping that the following year may see a somewhat stronger team for the club.

W. C. K.
Secretary.

Rowing

Another year has passed and again School has won the Inter-faculty Rowing Regatta. This is an honour which has remained in School ever since its inception.

A large number of men turned out early in October and it was only with difficulty that the crew was picked.

After a week's training on the machines, the boat went on the water. Here, although handicapped by rough water, the crew worked hard and under the capable coxing of "Squeak" Chalmers began to round into shape.

On the day of the regatta, October 20, the general opinion outside of the Little Red Schoolhouse, was that Dents were the crew to beat, with Meds running a close second. But in the race School eliminated Meds and defeated Dents in the finals.

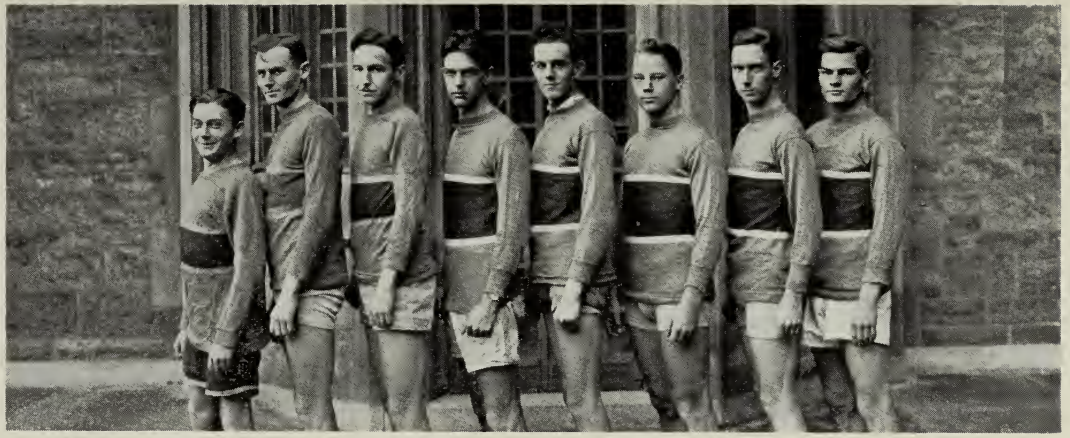
Schoolmen always have been, and still are very prominent in the University Rowing which is led by our "Tommy" Loudon.

Personnel of crew;

Bow—J. Boyd, 2—L. K. Walkom, 3—E. Davidson, 4—L. K. Lyttle, 5—W. A. Watts, 6—G. G. Milne, 7—J. D. Wright, *stroke*—J. M. Keith, *cox*—I. K. Chalmers.

J. M. Keith.

School Crew



I. K. Chalmers, (*Cox*), J. M. Keith, (*Stroke*), J. D. Wright, G. Watt, Curly Milne, L. K. Lytle, L. K. Walkom, E. Davidson.

Junior School Baseball

The Spalding Cup comes to School again for the second year in succession. We had a real team this year, and it took a good team to beat us. The group came fairly easy, Jr. U.C. didn't score against us in two games. In the semi-finals we disposed of Knox in two games for a total of 17-7. The real opposition came in the first game with O.A.C., played in Hart House. We played seven innings and O.A.C. won 1-0. We then journeyed to the Ontario Agricultural College, and after eleven strenuous and heart-breaking innings, emerged victorious 5-1, winning the round and championship 5-2. We should have won the game in seven innings, but we just couldn't get that odd run in.

The regular line-up was:—

Earl Davey, pitcher; Irv Chalmers, catcher; Karl Moeser, 1st base; Bill Campbell, 2nd base; Tom Carbone, s.s.; Bill Edmonds, 3rd base; Frank Hewett, Ralph Adams and George Wilson, outfielders. Earl Davey certainly deserves all the credit that can be given him. If it hadn't been for Earl—well. Our big sluggers were Bill Edmonds, Tom Carbone and Ralph Adams. Irv Chalmers, Karl Moeser and Bill Campbell played like pros, and it was a hard hit that beat either George Wilson or Frank Hewett.

The spares were:—

Carl Warren, Bill Carmichael and Gord Campbell, and they always fitted well into the championship machine.

W. N. WARD, *Manager.*

Senior School Baseball

This year has been a rather disappointing and unsuccessful one for the Senior School Baseball Team. Placed in the group with Sr. Dents and Meds, it met real opposition. The fast going Sr. Dent team, winners of the group, being a well-balanced team.

Although not registering a win, Sr. School fought with that same old spirit so noticeable in all "School" teams.

The team was composed of Armstrong, McVean, Kearns, Shiells, Parkins, Edmonds, Edwards, Ferguson, Cooey, Murby, Graham and Shields.

E. M. SHIELDS,
Manager.

Junior School Basketball

Though hardly as successful as last year, the team enjoyed a very good year.

After dropping the first game to St. Mikes in overtime, the team defeated their old rivals and followed this up by two well-earned victories over O.C.E. These two successes left the group championship to be decided between School and St. Mikes.

In the play-off it was St. Mikes' day on and though it was close for three quarters of the game, St. Mikes scored three field goals to win by a fair margin.

Members of Team

W. Hutcheon	*Forward*
M. Mercer	"
T. Kirk	"
L. Whiton	"
D. Ireland	*Centre*
D. Tait	"
S. Tennenbaum	*Guard*
C. Britnell	"
J. Slocombe	"
P. Ballachey	"

P. A. Ballachey,
Manager.

Gymnastics

School again lived up to expectations in Gymnastics and retained possession of the Wilson trophy, symbolic of the Interfaculty Championship. With last year's team of J. Williamson, E. Heslop and W. Heslop, School was hard to beat and came through in fine style, all three men placing on the Intercollegiate team.

There has been a splendid turn out of freshmen and some good material uncovered, both for Interfaculty and Intercollegiate work. Of these Wilkinson is the best and ably filled the substitute position on the Intercollegiate team, when E. Heslop was taken ill before the meet.

The individual honours go to Jack Williamson, who was not only the individual winner in the Interfaculty meet, but was also captain of the Intercollegiate team, and won the Werry Cup symbolic of the individual Intercollegiate Championship.

School men have usually comprised half of the Intercollegiate team and this year was no exception to the rule.

Jack Williamson graduates this spring but next year School will still have a strong team and should retain possession of the trophy.

WILF. G. HESLOP,
Manager.

Water Polo

A short résumé of the activity of the Sr. squad this season should be a lesson for next year's aspirants to the Eckhardt Trophy —a lesson which, if well taken, should mean nothing less than the Interfaculty Water Polo Championship.

Although the Seniors took their group without a loss, lack of practice in the final series wrought their downfall against the superior team-work of the Arts men.

The advent of International ruling has done away with the old gladiatorial game which won the championship for School in '27. As a result, a win depends more than ever upon the organized tactics of team-play. This is all important and must certainly be taken into consideration, for it is a trait or virtue, call it what you will, which is characteristic of the Engineers.

Plenty of splendid material is on hand for a crack machine next year and there is every reason to believe that you can pull a win— but above all, remember the old adage "Practice makes Perfect".

Will you?

JOHNNY GOSS,
Captain.

Swimming

The Engineers' victory at the Annual Interfaculty Aquatic Fixture last Fall was indeed a well-earned reward. For years the Meet was a tilt between S.P.S. and their old rivals—University College. Although the School swimmers did splendid work in the pool, it was well-nigh impossible to cope with the superior numbers from which the Arts squad was chosen.

This season, however, the Science Faculty mustered an aggregation fit to challenge all comers—leaving no room for doubt as to their supremacy.

Sufficient is the fact that School holds the Fitzgerald Cup, emblematic of the Interfaculty Swimming Championship, for 1928-'29.

No one man on the team deserves more credit than another, the win being due to the concerted efforts of everyone. It is quite in order, though, to make mention of one or two new comers to the sport upon whom will depend the success of future teams.

Pierdon stands in line for a good share of the honours next year in the sprints, while it is quite likely that the Scace-Nevitt combine can handle the Diving event.

A little concentrated effort in the Fall of '29 should anchor the silver mug at the Little Red Schoolhouse for another year—How about it, boys?

JOHNNY GOSS.

BALANCE SHEET OF THE ENGINEERING SOCIETY U. OF T.

February 29, 1929

Assets

Cash on hand	$ 144.94	
Cash in Bank—Current	2,012.73	
Cash in Bank—Savings	1,872.46	
		$4,030.13
Accounts Receivable	412.75	
Suspense—Returned cheques	60.00	
Employment	50.00	
	522.75	
Less Reserve	176.12	
		346.63
Merchandise on Hand		2,396.10
Investments—Victory Bonds		1,500.00
Office Equipment	678.34	
Less Depreciation	410.00	
		368.34
Smoking Room Furniture	70.00	
Less Depreciation	60.00	
		10.00
		$8,551.20

Liabilities

Accounts Payable		$ 393.29
Surplus Account:		
Balance—Mar. 31, 1928	$7,128.22	
Surplus—1928-1929	1,029.69	
		8,157.91
		$8,551.20

BALANCE SHEET OF THE ENGINEERING SOCIETY U. OF T.

Operating Account—Supply Department
April 1/28 to Feb. 28/29.

Inventory—			Sales	$8,632.18
April 1/28	$2,383.29			
Mdse. Purchases	7,035.29			
	9,418.58			
Less Inventory, Feb., 1928	2,396.10			
		7,022.48		
Gross Profit to General Operating Account		1,609.70		
		$8,632.18		$8,632.18

General Operating Account
April 1/28 to Feb. 28/29.

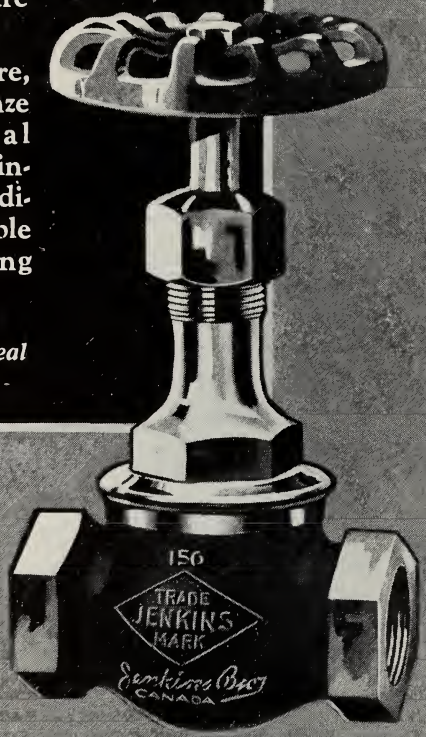
Salaries	$ 512.00	By Gross Profit— Supply Dept	$1,609.70
General Expenses	118.81	By Fees	1,000.00
General Expenses	118.81	By Interest and Discount	70.95
Delegates' Expenses	94.50		
Piano & Music	44.75		
Telephone	108.88		
Entertainment of Guests	18.25		
Printing & Office Supplies	58.53		
Publications	176.48		
Dinner	39.25		
Grants to Clubs	82.85		
Donations	25.00		
Community Night	25.00		
Elections	46.66		
School "At Home"	300.00		
	1,650.96		
Net Operating Surplus, 1928-1929	1,029.69		
	$2,680.65		$2,680.65

QUALITY

THE beautiful natural color of Jenkins Bronze Valves is indicative of the supreme quality for which these Valves are world famous.

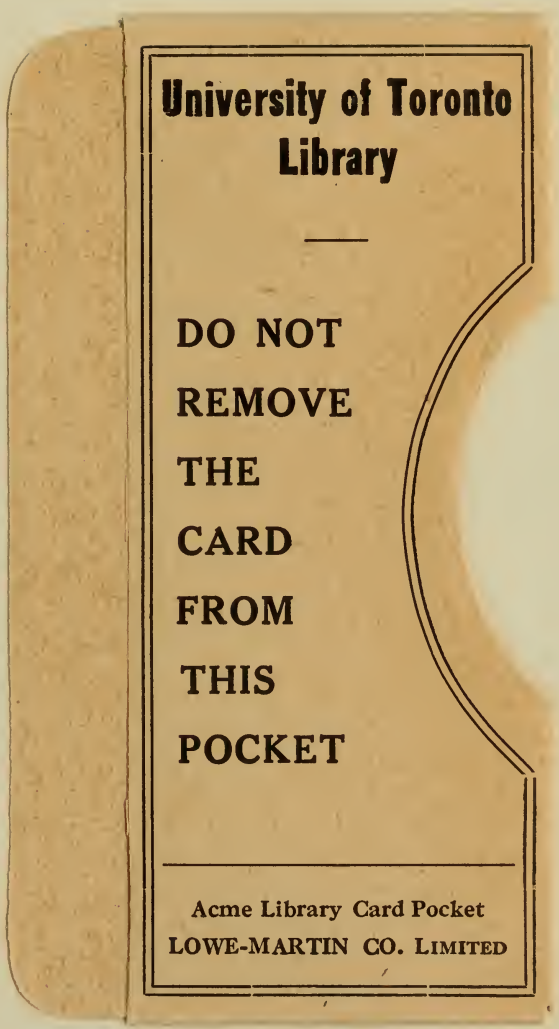
The use of pure, high grade bronze and the total avoidance of inferior scrap is directly responsible for this lasting color beauty.

Made at Montreal



Always marked with the "Diamond"

Jenkins Valves

SINCE 1864

BINDING LIST JUL 1 1954